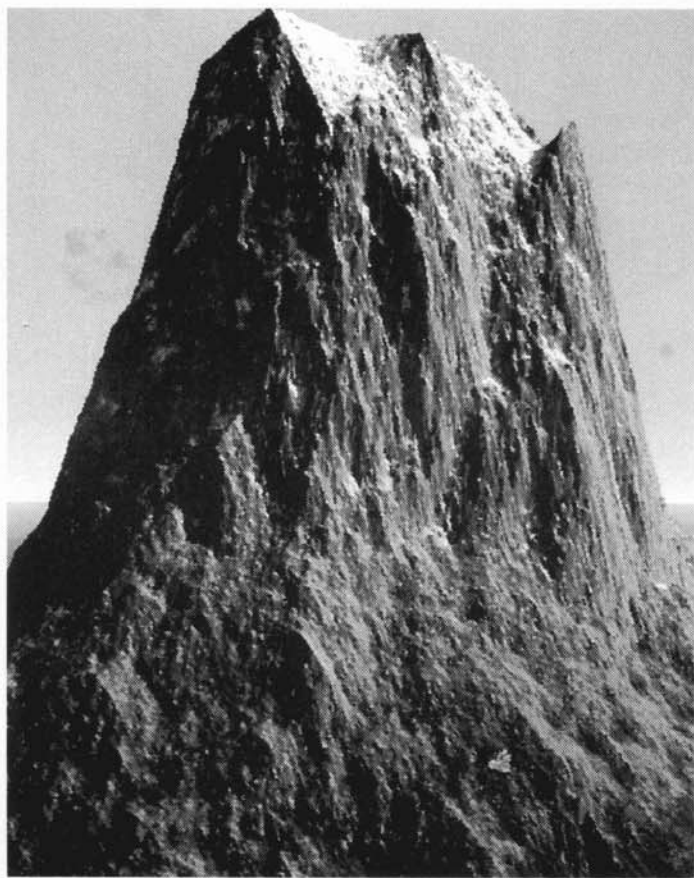


VISTAPRO^{2.0}



USER MANUAL

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USER MANUAL

VIRTUAL REALITY LABORATORIES, INC.

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INTRODUCTION TO VISTAPRO

Vistapro makes pictures of landscapes from two different types of data. Pictures of real landscapes are made from U.S. Geological Survey Digital Elevation Model data. The user can also explore billions of imaginary fractal landscapes generated from data produced by Vistapro itself. Starting with the control screen, you will notice a rectangular picture bordered by blue on the left two-thirds of the screen. This contains a topographical map of the landscape that you can explore. Vistapro's topographic map uses shades of green to represent the lowest altitudes, browns to represent the middle altitudes, and gray-whites for the highest altitudes. You can control Vistapro using the buttons on the right side of the screen.

To get acquainted with Vistapro, move the red crosshair to the Camera button and click the left mouse button. Note that the Camera button appears indented, which means the crosshair will now place the Camera (the small black square on the map) when you click the left mouse button over the topographic map. Note that the X, Y, Z coordinates within the boxes next to the X, Y, and Z buttons, change each time you click on a new Camera location. The Z coordinate shows the altitude of your camera. It is automatically set to 30 meters above the point that you clicked on. When you have your camera placed where you want it, add several hundred units to the Z altitude by clicking on the numerical value and putting in the new number. *Be sure to press return after entering the number, and don't click on the Z button itself, since this locks the Z into its initial position.* The extra altitude will put the camera far enough above the surface to reduce the size of polygons in the foreground. Next, click on the Target button, then click on the topographic map to place the target. Now a small + will appear on the map to identify the target location. The manual contains information on how to use all the other controls, but for now, please click on the CMap button. This will cause the other control screen for Vistapro to appear. This screen is used for adjusting the colors, contrast, and brightness used to paint the landscape. Since this is merely a tour, don't change any of the settings. Click on OK at the bottom left part of the screen to return to the primary control screen. Using the right mouse button, go to the top left part of the primary control screen to view your pull down menus. Don't select any right now. Again, the manual

describes their usage in detail. Click Render on the bottom control panel and wait. Vistapro will render (draw and color) a rough (big polygon) view of the target you have chosen. After it has rendered the picture, a click on any part of the screen will return you to the primary control screen. Notice that the default Poly value is 8. This is the roughest and fastest view. It helps you quickly reset the camera view and lighting until you think you have it the way you want it. The lower Poly values increase the rendering time as they yield a more detailed picture. Now that you know your way around Vistapro, you may wish to take a few minutes to follow the tutorials. We designed the tutorials to teach by doing. When you have finished the tutorials, you will have an intuitive understanding of Vistapro which will increase your ability to use the program. The remainder of the manual is simply a reference text if you should want to know more about a particular feature.

Notes on Vistapro

Vistapro String Gadgets

To change a numerical value on any Vistapro control panel, you must hit the "return" key after typing the number. Simply entering the data will not cause it to change from the beginning value unless "return" is pressed.

Vistapro on Accelerated Amigas

The program selection "Vistapro" is for those who have standard Amiga 500's, 1000's or 2000's without an accelerator board. We optimized the program selection "Vistapro.881" for use with a 68020, or 68030 AND a 68881 or 68882 math co-processor or a 68040. Vistapro.881 will NOT run without a math co-processor or on a 68000 based machine. Both programs are otherwise identical.

Vistapro Landscapes

All Vistapro Landscapes on the disk have the file protection mode set to "read only". This assures that you will not accidentally delete a landscape. The "Protect" function on your Workbench will allow you to reset the

protection. You may set "Normal" protection by typing "Protect <filename> rwd" where <filename> is the name of the file you want to change. Do not type the "<" or ">" characters.

Vistapro Stack Requirements

Vistapro contains some recursive routines which may require large amounts of stack space. If Vistapro is run via its icon from the WorkBench, you needn't worry about the stack — it has already been set up in the Vistapro.info file. If Vistapro is run from a CLI or Shell, you must ensure that you run Vistapro with enough stack memory. From the CLI or Shell you can type "Stack" to see the current default stack setting. The usual default value is 4000 bytes. (The Lake function is the only function requiring much stack space. If you do not use the Lake function, you don't need to increase the stack beyond the 4000 byte default.) Otherwise, if the current stack setting is fewer than 50000 bytes, we suggest raising it. If it is very much larger, consider lowering it, especially if your machine is short of memory (see "Loading Vistapro" below). To set the default stack value to 50000 bytes, type "Stack 50000" from the CLI or Shell. Vistapro is now ready to use. If you are using Large or Huge mode, 50000 may not be enough stack space for all lakes. You may want to try 60000 bytes in Large mode and 120000 bytes in Huge mode.

Loading Vistapro from the CLI or a Shell

Before starting Vistapro from a CLI or Shell, be sure the default stack size is set to at least 50000. You can start Vistapro from any CLI or Shell by typing "Vistapro" from the directory where Vistapro is located. You can force Vistapro to load a particular landscape by including its device:path/name on the command line. Some possible examples:

Vistapro ElCap.scape

Vistapro df0:CraterLake.scape

Vistapro dh0:Vistapro/Landscapes/Mons.scape

You may, of course, simply type "Vistapro" and load a landscape via the "Load Landscape" menu items.

Limits of Vistapro's World

Hypercube Engineering created a fast mixed integer and floating point 3-D engine for use in Vistapro. Vistapro displays landscapes properly, when the Camera and Target are kept within -2000000000 and +2000000000 (on all three axis). Placing the camera or target outside this range or underground may result in distorted images, or no images at all.

What is Vistapro?

Vistapro is a 3 dimensional landscape simulation program. Using U.S. Geological Survey (USGS) DEM (Digital Elevation Model) files, Vistapro can accurately recreate real world landscapes in vivid detail. As a fractal landscape generator, Vistapro can create landscapes from a random seed number. Often these landscapes are more interesting than those found in the real world. Vistapro supports over 4 billion different fractal landscapes. Simply by changing a number, you can create whole new worlds. Vistapro is also a tool. Besides simulating real and imaginary landscapes, it allows extraction of a certain amount of data from the DEM files. You can use the program output as an educational tool, as well as a research tool for the study of topography. In addition, by simply clicking on several buttons, you can create rivers and lakes in a landscape where none existed previously. Vistapro converts DEM files to Turbo Silver data which will enable you to import them into Turbo Silver or similar ray tracing programs to add stunning realism to ray tracings. For instance, you can add a house that you have worked on in a favorite rendering package to a real world landscape. Imagine being able to place an architectural creation on top of Mount St. Helens or on an island in the middle of a fractal landscape!

How Vistapro Works

Vistapro uses a combination of artificial intelligence, chaotic math, and a user definable set of values to simulate landscapes in their natural state. At present, the USGS has converted about 40% of the United States and its territories to DEM files which you can potentially use with Vistapro. Vistapro is a single frame generator, meaning that it acts like a camera; every time you point the camera and click, it will render a new view of the landscape. You can view Landscapes from a practically infinite

combination of heights, angles, and distances. Using the combination of user controllable values and Vistapro's built-in routines, you are able to make landscapes as realistic or as surreal as desired. It is easy to alter tree and snow lines, haze, exposure, rivers, lakes, and light sources to customize the appearance of the landscape. Vistapro uses data derived from United States Geologic Survey Digital Elevation Mapping files for generating its images. These files contain coordinate and elevation data at 30 meter (roughly 100 ft.) increments. Each Small Vistapro DEM file contains about 65,000 elevation points and generates 130,000 polygons. A Large Vistapro DEM file contains about 256,000 data points and generates 512,000 polygons, and a Huge Vistapro DEM file contains about 1,000,000 data points and generates over 2,000,000 polygons. Vistapro doesn't know anything about what covers the terrain. It doesn't know where the trees, roads or buildings are. It does its best to color each polygon (based upon a few numbers that you input) in a realistic way. It still can't draw each rock and tree.

Some Uses for Vistapro

Vistapro is not only of interest to scientists and engineers. Artists, writers, teachers, game designers, travelers, and people just looking for hours of entertainment will appreciate Vistapro. Artists can design realistic scenery as backgrounds for their artwork. Writers can create worlds and see them through their characters' eyes. Geography, geology, and meteorology teachers can use Vistapro to breathe life into their subjects. Game designers can make realistic or surrealistic scenery for backgrounds in their games. Travelers, hikers, and backpackers can preview their journeys. Vistapro can be pure entertainment. Explore fascinating terrains that you might never have a chance to see, or visit distant planets that man has not yet trod. Build new worlds that exist nowhere except in the imagination, and then visit them as if they were really there. On the other hand, there are many scientific and business applications for Vistapro. Environmentalists, surveyors, geologists, architects and engineers will all find Vistapro a useful adjunct to their work.

Speeding Up Vistapro

There are two ways to speed up Vistapro - strategy or brute strength. After you have used the program for a while, you will learn to "read" the lower resolution settings in Vistapro to see if you are obtaining the picture you want. When the scene is properly positioned and lighted, and when you have set the tree line, snow line, and water levels where you would like, then and only then, render the picture at the time-consuming full resolution mode.

The other alternative method of speeding up Vistapro's rendering process is to add power to your machine. We programmed Vistapro to use every available computing resource as efficiently as possible. The time consuming rendering process is a function of the enormous amount of computation that Vistapro must do, not any lack of optimization of the program itself. Vistapro will automatically look for and use whatever processing resources you supply. When you add an accelerator board or upgrade to a faster machine, Vistapro will take advantage of the additional processing power without any adjustment or request on your part.

Texturizing the landscape can take a significant amount of time, as can the Tree functions. We suggest test rendering without those functions active to "prove" the scene, and then after you are satisfied with the layout, add the Texturization and Trees.

Realistic ray traced CAD objects, detailed 3-D animations, and realistic landscapes are all a part of the emerging software categories called virtual reality, artificial reality, or simulation. These categories all require immense computational capacity, but as the cost of computing power continues to plummet, these types of programs will become the standard. As a Vistapro user, you are pioneering virtual reality exploration and it is admittedly a bit tedious on an unaccelerated machine. But, looked at another way, it is amazing that this type of rendering can be done at all, let alone on a personal computer. Until the advent of Vistapro, landscape renderings of such realism were only available to users of workstations and supercomputers for secret government projects.

Making the Most of Vistapro

Making a stunning landscape in Vistapro requires the combined eye of a photographer and the artistic sense of a painter, but there are a few tips which can help improve your first attempts:

Lighting

Experiment with the lighting. If the light is coming from behind the camera, scenes may appear rather "flat." There won't be a strong feeling of three dimensionality. You can create dramatic shadowing effects by choosing the proper lighting direction and angle. With the power of Vistapro, you can choose to light the scene in ways which could never occur in the real world, or, if you are a purist, you can select the correct solar position for that particular season and geographic location and time of day. Our Distant Suns planetarium program (or most other astronomy programs) can easily calculate such solar lighting conditions in order to correctly set the light, target, and camera position to obtain maximum realism in your rendering. If you just leave the lighting to chance, you may find that shadows cover your scene, and it does not look good. We find that setting the light source (the sun) at 45 to 90 degrees to the left or right of the camera gives the best results. For example: if the camera is facing due north, placing the sun at the southeast, east, southwest or west, usually makes the best pictures. Placing the sun directly behind the camera usually results in a lack of three dimensionality and contrast, although there are times when this is the desired effect. Back-lit scenes (for example: camera facing north, sun shining from the north) can also yield interesting images.

Snow and tree line setting considerations

If you know the normal range of snow line for the season that you are viewing and at what altitude the tree line begins, you can use Vistapro in a very realistic way. Tree line varies with latitude until, in arctic regions, it reaches sea level. Snow levels vary with the weather and altitude. A little research at the local library or even listening to the weather on the evening news will allow you to increase the realism in Vistapro landscape rendering. Of course you needn't follow the real world as an example. You are free to set the tree and snow lines wherever

you want. You may want to see a landscape as it might have looked during the last ice age, or maybe how it will look after severe global warming from the greenhouse effect!

Changing colors

Use the Color Control Panel to change the colors, contrast, and exposure used to render the landscape. Most landscapes shipped from us have shades of green for lower elevations, brown for middle elevations, and white for upper elevations. Try changing the Tree colors to pinks, and whites. This makes them look like flowering fruit trees in the spring. Change them to reds, browns and yellows for an autumn scene.

Foreground “fat polys” or “jaggies”

Since the accuracy of the data limits the detail that Vistapro can display, some of the foreground features will contain “fat polys” or “jaggies.” Vistapro builds all images with polygons — millions of polygons per scene. The polygons are all about the same size but those near the camera will appear very large on the screen, just as an object very near you will look large, while when it is far away, it will look very small.

There are several ways of reducing this effect. One of the simplest is to raise the camera a few hundred meters above the ground. If you use the mouse to position the camera it is automatically set 30 meters above the landscape. Since the nearest polygon (the one right under the camera) is only 30 meters away it will look very large (if it is within the field of view). If you raise the camera 300 meters it will look about 10 times smaller.

A second method is to use the Texture function. This function breaks nearby polygons up into several smaller pieces and renders each at a slightly different shade — giving them a marbled appearance.

Another way of hiding the foreground polys is to use the Tree function. Trees are made of many small polygons and can obscure the large polygons of the ground underneath them.

If you are looking at a rather small portion of the landscape you might consider using the Enlarge function to blow that section of landscape up to twice its size.

A third method of hiding “fat polys” is to use Gouraud shading. This blends the edges of the polygons with each other, eliminating the sharp color change from one polygon to the next, and provides a beautiful artistic interpretation of the scene. This shades even very large foreground polygons into oblivion. Texturizing and Gouraud shading can be combined to generate even more interesting details.

Sometimes there is a small bump immediately in front of the camera that is blocking a large part of the scene. Moving the Camera a few meters higher may be enough to move the bump out of the field of view, or move the camera far enough forward to get the bump behind it.

A note about aesthetics

Remember, there is no more a “right” way to use Vistapro than there is a “right” way to use a camera. A child using a camera or Vistapro may derive a lot of knowledge and entertainment from a result which would not please a more professional artist. Like the natural world it imitates, Vistapro gives the artist an unlimited number of choices for portrayal. What looks great to one person may not appeal to the next.

Fractals imitate the way nature looks, but they are not the same. They have no knowledge of geology, plate tectonics or erosion. So, whatever pictures you produce with Vistapro will be interpretive because Vistapro is producing an artificial reality to begin with. The philosophical and aesthetic ramifications of virtual reality construction are immense. Vistapro is an early forerunner of a medium of art and expression, as powerful and unique as photography for creative work.

For many years after their introduction, photographs sparked lively debate about whether they were “art.” Computer art and virtual reality simulation seem destined to foment a similar debate in the future.

Exploration with Vistapro

As a virtual reality simulator, Vistapro allows you to explore landscapes you will probably never be able to explore first hand. We hope that most of you will have the opportunity to visit a few of the national parks, but, it is highly unlikely that any of us, except those who are now children, will have the chance to tour the caldera of Mons Olympus on Mars. As

we are able to convert more of the data already available from planetary probes and undersea explorers, Vistapro will allow you to explore forbidding and alien landscapes decades, or even centuries, before the first human explorer is able to take tourist snapshots. By giving its users the ability to wander about distant landscapes, rendering true perspective pictures of their choice, Vistapro and later progeny will free humanity from its current boundaries long before such explorations are commercially feasible.

Your own data

Vistapro can be used to visualize any kind of surface which can be represented as a two dimensional array of integers (up to 1024x1024). Scanning tunneling electron microscope data is an example of such data — think of it as a tiny, tiny landscape! You might even be able to convert your backyard into Vistapro format!

VISTAPRO USER MANUAL

Getting Started

First make a backup of the Vistapro disk(s), following the instructions in the AmigaDOS users documentation that came with your version of AmigaDOS.

Floppy System

Installation

Before running Vistapro for the first time, you should make a working copy of the Vistapro Program disk. If you lose the copy, then you will still have the original.

Making Working Copies

These next few steps are here for the beginner, but you may use any of the PublicDomain or CommercialDisk back-up programs you feel comfortable with to make a working copy of Vistapro. IF YOU HAVE ANY PROBLEMS, PLEASE READ THE AMIGADOS MANUAL THAT COMES WITH THE MACHINE ON HOW TO DO BACK-UPS.

One Drive Systems:

1. Insert Vistapro into the disk drive.
2. With the mouse, click on the Vistapro Icon with the left button once.
3. Now press and hold the right mouse button down and select Duplicate from the project menu in the upper left hand corner of the Workbench screen.
4. AmigaDOS will prompt you with a Continue/Cancel requester.
5. With the left mouse button, press Continue.

6. Next AmigaDOS will prompt you to insert Vistapro. With the left mouse button press Continue.
7. The disk drive light will come on, and the drive will spin for a while.
8. After a while, a requester will pop up and ask for the destination disk. Insert the disk; this should be a blank.
9. Your Amiga will prompt you to insert the source disk. Then AmigaDOS will ask you to insert the destination disk. AmigaDOS may repeat this process several times, depending upon how much memory you have in your Amiga. When you are finished, put the original copy of Vistapro in a safe place.

Multiple Drive System:

1. Place Vistapro in one of the drives and the destination disk in one of the other drives.
2. With the left mouse button, click on the Vistapro disk icon and hold it down.
3. Next, drag the mouse, with the left button down, over the disk icon where you want to place your copy of Vistapro. Once the Vistapro icon is over the destination disk, release left mouse button.
4. If you have a Workbench or a hard disk, the copying will start. If not, AmigaDOS will ask you to put the Workbench disk back in a drive for a few seconds, so that the system can read the disk copy command.
5. Follow the requester boxes, and in a minute or so you will have a working copy of Vistapro.
6. When complete, put the original copy of Vistapro in a safe place.

Renaming Your Working Copy

The next step is to rename the working copy. If a good working copy has been made, the disk should read 'copy of Vistapro'.

1. Click on 'copy of Vistapro' disk icon once with the left mouse button.

2. Now press and hold the right mouse button down while selecting Rename from the Project menu in the upper left hand corner of the Workbench screen.
3. Next, a small window will open in the middle of the screen and the name 'copy of Vistapro' should appear in it.
4. Press the DEL key until the 'copy of' is gone. Make sure to delete the space before Vistapro.
5. Now press return. In a second, the Vistapro icon should read 'Vistapro', NOT 'copy of Vistapro'.

Hard Disk

There is a hard disk installation script on the Vistapro disk. To use it, you must have booted from a complete Workbench, not from the Vistapro disk. Just double click on the Install icon and answer the questions as they come up.

General Information About Vistapro

The Vistapro Disks

On the Vistapro disk you will find two copies of Vistapro, a copy with the name "Vistapro", and a copy with the name "Vistapro.881". There is an install script called "Install HD" for hard disk installation. Also there is a "Read Me" file for additional information that is not included in this manual. On a second disk, named 'Landscapes', you will find several Vistapro Landscapes for use with Vistapro. Vistapro's landscapes are identical in format with Vistapro landscapes, and can be used by both programs. The landscapes on the Vistapro disks are archived to take less room on the disks, and must be unarchived by the Install program.

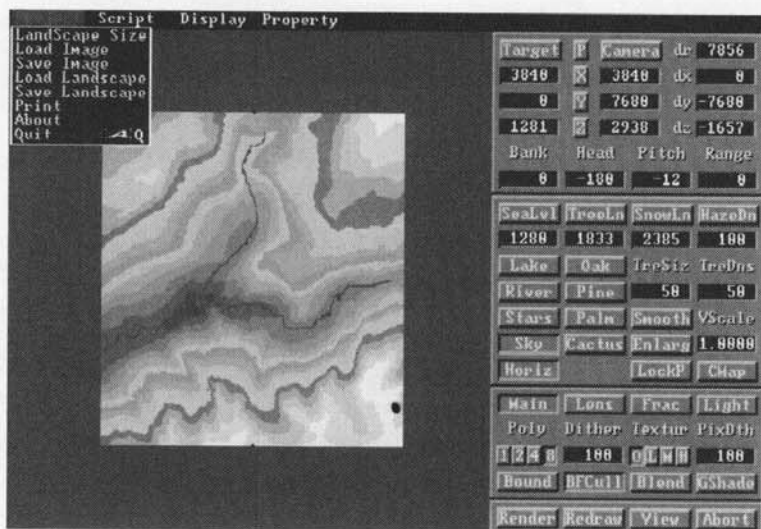
VISTAPRO MENUS

If you are not familiar with the way that you use menus on the Amiga, simply click on the right mouse button when Vistapro is displaying the control screen. This will show a title bar at the top of the screen. Keep holding down the right mouse button and move the crosshair to one of the two selections in the title bar. Continuing to hold down the right mouse button, drag it down the menu. You will notice that it illuminates various selections or causes another sub-menu to appear. Continue holding down the button, until you illuminate your choice. Release the button to select that choice.

There are three main menus in Vistapro: the Project Menu, which controls loading, saving and printing, the Script Menu, which controls script creation and execution, and the Display Menu, which controls the different resolutions that are available with Vistapro.

Project Menu

Note — Many of the following menus involve the use of the Vistapro file requester. The file requester contains a space to enter the name of the drawer where you keep files of the given class, (ie. the Landscape drawer for landscapes, or the Pic drawer for IFF images) a window containing a partial listing of the contents of that drawer and a scroll bar to the right of the window for scrolling the contents of the window, a space for the name of the file you are dealing with, and a list of common device names where you are likely to find the drawer. (ie. DF0:, DH0:, RAM:)



PROJECT MENU

Landscape Size

Small

The Small size landscape sets up a 258 x 258 topographic map region. It works in most Amigas with at least 3 megabytes of available RAM, and is used for loading single Vistapro Landscape files.

Large

The Large size landscape sets up a 514 x 514 topographic map region. It works in most Amigas with at least 4.5 megabytes of available RAM, and is used for loading up to 4 small Vistapro Landscape files, or any single Vistapro Landscape file up to 514x514 data points in size. It is for use with Vistapro "X" series contiguous landscapes, to load large contiguous regions. You may also load a small landscape and "enlarge" it to render with more apparent detail. See "enlarge" function.

Huge

The Huge size landscape sets up a 1026 x 1026 topographic map region. It works in most Amigas with at least 8 megabytes of available FAST memory, and is used for loading up to 16 small Vistapro Landscapes files, or any single Vistapro Landscape file up to 1026 x 1026 data points

in size. The Huge size landscape is used with Vistapro "X" series contiguous landscapes, loading large contiguous regions. You may also load a small landscape and "enlarge" it twice to render in very fine detail. See "enlarge" function.

Auto

Postpones setting up a topographic map region until it checks the header of the Vistapro Landscape file next loaded with "Load Landscape". At that time a topographic map region is set up to match the size of the file to be loaded.

Load Image

The Load Image menu item allows you to Load and Display a previously saved Vistapro Image File. The Drawer name will be the name of the drawer in which you have saved IFF images, and the Device will be the disk where you will find this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ":", followed by the name of the drawer where you will find the images, i.e. MyDisk:Pics. On a hard disk, you might use something like Work:Vistapro/Pics.



VISTAPRO FILE REQUESTOR

IFF

The Load, IFF submenu item loads standard Amiga IFF files, and IFF HAM files, regardless of resolution.

IFF 24

The Load, IFF 24 submenu item loads Amiga Commodore standard 24 bit IFF files, regardless of resolution. They must be no more than 768 pixels wide or 484 pixels tall. Smaller images will simply be loaded towards the top left corner. After loading the 24 bit image data, Vistapro will draw the image to the display screen at the current display settings.

Save Image

The Save Image menu item allows you to save an image that you have rendered as an IFF file. The Drawer name will be the name of the drawer in which you want to save IFF images, and the Device will be the disk where you will find this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ":", followed by the name of the drawer where you will find the images, ie. MyDisk:Pics. On a hard disk you might use something like Work:Vistapro/Pics.

IFF

The Save, IFF submenu item saves in standard Amiga IFF format, using the current settings of the display menu. You can load these images into paint programs such as DPaint III for non-HAM renderings, and DigiPaint 3 for HAM renderings. The picture that is saved is the one that is currently on the "View" screen. This is usually the scene that has just been rendered or redrawn.

IFF 24

The Save, IFF 24 submenu item saves in Amiga 24 bit IFF format, with the image width and height the same as the currently displayed image. For example, if you are displaying in Lo-Res, no interlace, no overscan, this will save a 320x320 IFF24 file.

RGB

The Save, RGB submenu item saves the Rendered image in the format output by Sculpt-Animate 4D. Vistapro produces only 746x484 pixel files. They are given the base-name supplied by you with ".ored", ".ogrn", ".oblu" extensions used by the Mimetics framebuffer program, version 1.01. For example, if you select PIC as the base picture name, Vistapro will produce: Pic.ored Pic.ogrn Pic.oblu.

Vistapro has the ability to execute an AmigaDOS control file after generating each frame of an animation. Vistapro passes the name of the data file just produced (IFF, IFF24, or RGB formats) to the scripting function. The control file can run whatever programs you want to process the picture. For example, for the Mimetics framebuffer, you can run the Mimetics Framebuffer program in command-line mode to "encode" the picture and then delete the file.

```
.k FILE/a  
c:fbuf -e <FILE>  
c>Delete <FILE>.ored  
c>Delete <FILE>.ogrn  
c>Delete <FILE>.oblu
```

If you have a single-frame recorder, you could also send a command to step the recorder, etc.

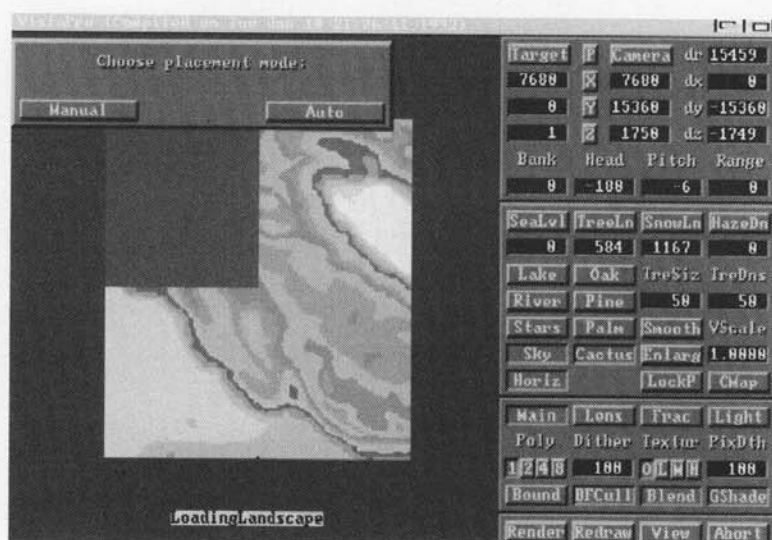
Load Landscape

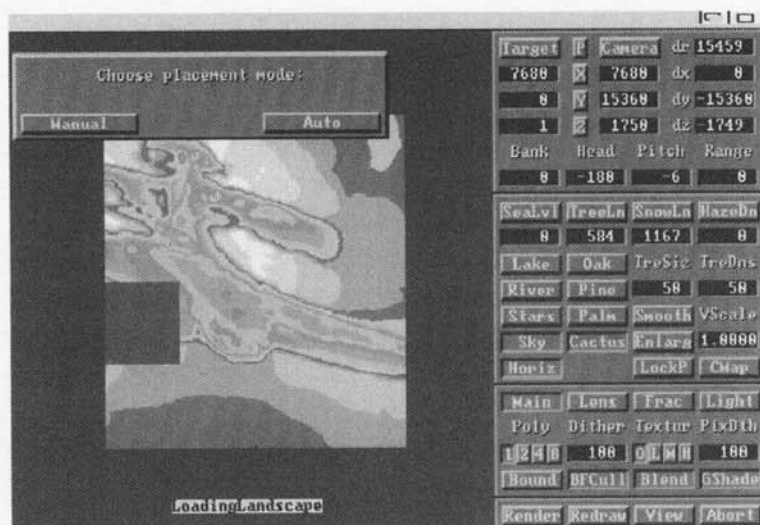
The Load Landscape menu item allows you to load a Vistapro DEM landscape file or Vistapro ColorMap header. The Drawer name will be the name of the drawer in which you keep your landscapes or ColorMaps, and the Device will be the disk where you keep this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ":", followed by the name of the drawer where you keep landscapes or ColorMaps.

Vistapro DEM

The Load Landscape, Vistapro DEM submenu item allows you to select a Vistapro DEM Landscape file into Vistapro. This can be a landscape that comes on the Vistapro disk, a landscape that you have previously saved, or a landscape from a Vistapro expansion disk. Note that the Landscapes that come with Vistapro and those that are on the Vistapro expansion disks are write protected, to avoid the possibility that they will accidentally be overwritten by a Save Landscape command. To unprotect these images, (you probably will never need to do this) at the CLI or SHELL prompt, type "Protect <landscape>.scape rwed", where you replace <landscape> with the name of the landscape you want to unprotect.

If you have set Size to "Large" or "Huge," a grid of landscape regions is displayed in the topographic map region. When you have selected the Load Landscape, Vistapro DEM submenu item, and have selected "Large" or "Huge" previously, you will be asked to choose your placement mode. Manual mode allows you to point to the quadrant of the topographic map you want to load the landscape into, regardless of whatever else may be there, and Auto looks at the coordinate information in the header of the landscape and tries to place it correctly in relationship to other landscapes already loaded. If Vistapro cannot place the landscape, it will warn you that the landscape is out of range. The Auto feature works only with X series Vistapro DEMs.





LOAD HUGE PICTURE

DEM Region

Vistapro will load the requested Landscape file into the lower left corner of the topographic map region, and then search the current Landscape directory for other landscapes that are located within the current topographic map region. The DEM Region function requires the "X" series Vistapro Landscape files. Vistapro's Load-Region function will search all files in a given directory for additional landscapes to load into the current topographic region. It determines which landscapes to load by examining the header of each landscape, the header has information about the file's longitude and latitude. We highly recommend that you install different landscape sets into different directories. That way Vistapro will have fewer files to examine when you load a region. There is also the possibility that some data from other planets will overlap areas of the earth, or that a DEM file you have modified (Vistapro saves the current landscape's coordinates along with its other data) will load in on top of the unmodified data. You wouldn't want Vistapro to have to search through thousands of files to find the four that fit into the current area! Also, the file requestor will take quite a while to fetch all the filenames when there are thousands of files in a directory.

ColorMap

The Load Landscape, ColorMap submenu item allows you to load an existing ColorMap onto a landscape that you have already loaded. This does not affect the Landscape DEM data in memory, just the Color Palette information. You can load a ColorMap from another Vistapro DEM Landscape file, or from a Vistapro ColorMap file that you have saved previously. See Color Control Panel for more information on ColorMaps.

Binary

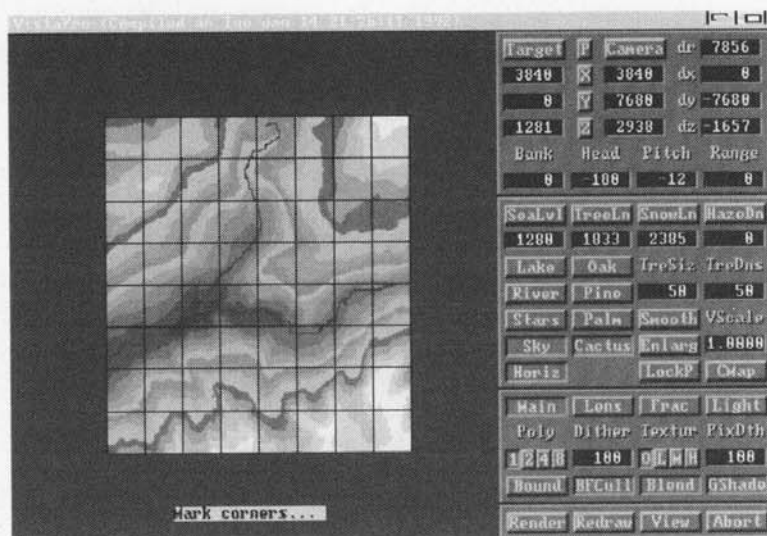
Binary loads the requested binary file as DEM data. It is useful for porting digital data that is not in DEM format into Vistapro or for those of you trying to create your own landscapes. Vistapro's binary format is very simple. Each file consists of a number of signed 16 bit integers (Motorola format on the Amiga — hi byte first, low byte second) in sequence. The first integer in the file is loaded at the lower left hand corner (south-west corner), the second to the right (east) of the first, etc. When the south-most row is finished, the next row up (north) is loaded. Data continues until all rows have been filled. A Small Vistapro landscape consists of 258x258 (rows x columns) integers (133,128 bytes). A Large Vistapro landscape consists of 514x514 integers (528,392 bytes). A Huge Vistapro landscape consists of 1026x1026 values (2,105,352 bytes). If your data is less than the required size from left to right (east to west) you will have to either pad to the required length or scale your data to fit. The file need not have enough data to fill all rows; if the file is short the top part of the landscape will simply be left with altitude 1.

Save Landscape

The Save Landscape menu item allows you to save a Vistapro DEM Landscape file, a Vistapro ColorMap header, or a Turbo Silver Object file. The Drawer name will be the name of the drawer in which you keep your Landscapes, ColorMaps, or Turbo Silver Object files, and the Device will be the disk where you keep this drawer. On a single floppy system, the drawer name will contain the name of the disk, followed by a colon ":", followed by the name of the drawer where you keep Landscapes, ColorMaps, or Turbo Silver Object files.

Vistapro DEM

The Save Landscape, Vistapro DEM submenu item allows you to save a randomly generated fractal landscape as a Vistapro DEM Landscape file. This file will not contain surface features such as lakes and rivers. This will save the ColorMap now in effect, along with the landscape.



SAVE TURBO SILVER

Turbo Silver

The Save Landscape, Turbo Silver submenu item allows you to save the current landscape as a Turbo Silver Object file. Vistapro saves landscapes as Turbo Silver Objects at all levels. This is because Vistapro saves a landscape as a series of Turbo Silver Objects, rather than a single one. Vistapro saves landscapes at all polygon sizes. If Vistapro hasn't yet colored the landscape, it will inform you of this and give you the choice of letting Vistapro color the landscape at the current setting or aborting the save.

When you select the Save Landscape, Turbo Silver submenu item, Vistapro will draw an eight by eight grid over the topographic portion of the screen. You can then select a portion (or all) of the landscape by clicking with the left mouse button on the upper left hand corner of the area that you want saved as a Turbo Silver object. At this time you will see a rubber band box appear, and you need to position the mouse to the

lower left hand corner of the area you want saved. This is the area within the box. You then click again with the left mouse button.

Please note that these TurboSilver objects are of extreme complexity, and will require a good deal of memory to render when using Turbo Silver or Imagine. A polygon sized 2 landscape will require at least 7 megabytes of memory to render with Turbo Silver, and a complete polygon sized 1 landscape will require more than 30 megabytes. We suggest that you clip only the regions that you actually need, in order to save memory, or render at a larger polygon size (lower resolution).

ColorMap

The Save Landscape, ColorMap submenu item allows you to save the current Color Palette settings as a Vistapro ColorMap. This does not save the DEM Landscape data, and results in Vistapro saving a much smaller file. You may want to keep several different ColorMaps around, so that you can quickly load them into any landscape. See "Color Control Panel" for more information on ColorMaps.

Extended DEM

Vistapro has an extended DEM format which allows you to save all the current settings of the program along with the DEM data. This data includes colors, shades, camera and target positions, script mode, haze level—virtually every setting in the program. This is useful when continuing an aborted animation. Extended DEM files range from 300KB to 400KB bytes each, for small landscapes, and up to 4 megabytes for Huge landscapes.

Print

The Print menu item allows you to export Vistapro renderings directly to your printer. This prints whatever is on your View Screen, so you can use Load IFF to load an image into memory, and use Print to send it to the printer if you want to do so.

About

Vistapro

The About, Vistapro submenu item tells you about the program Vistapro, the authors, and the publishers.

Landscape

The About, Landscape submenu item tells you about the landscape, including the file name, the landscape name, and any comments about the landscape. This information comes from the header contained at the beginning of Vistapro's Landscape files. If you generate a fractal landscape, and save it, the header will contain information about the fractal setting used to generate the landscape, which you can use for your own future reference.

Quit

The Quit menu item closes down Vistapro and returns you to the Workbench.



SCRIPT MENU

Script Menu

The scripting controls allow creation of multiple unattended views of a landscape. The scripts are lists of camera and target positions, and are landscape independent. You can use the same script for several different landscapes, or you can change the settings for the current landscape re-executing the script. Script control allows changes to be made to the landscape without having to rebuild the script every time. For instance, if you want to change the light source direction, or if you want to see a landscape from several views with and without water, all that you have to do is make the appropriate changes and execute the proper script. (See ReadMe.script).

Vistapro 2.0 also supports several additional script commands which allow you to control most other function of the program from within a script file. You can only generate these commands by editing the script file with a text editor (Amiga's ED, TxEEd, CED, etc...). The new commands have the following form:

CommandName: argument(s) comment

for example:

CameraX:	1234	Set Camera X position to 1234
VerticalScale:	1.2	Scale landscape to 1.2
Render:		Render landscape

The CommandName parameter can be either upper or lower case (or mixed), and must have the trailing colon.

A missing numerical argument is treated as a 0.

Comments are, of course, optional.

For a list of commands, see the ReadMe.script file on your Vistapro Disk1.

You can also access all of the Script functions with ARexx. For a complete list of commands as well as instructions on how to use the ARexx interface in Vistapro, see the file ReadMe.ARexx on your Vistapro Disk1.

Note: Many of the following menus involve the use of the Vistapro file requester. The file requester contains a space to enter the name of the drawer where you keep files of the given class, (ie. the Script drawer for anim scripts, or the Anim drawer for IFF images) a window containing a partial listing of the contents of that drawer and a scroll bar to the right of the window for scrolling the contents of the window, a space for the name of the file you are dealing with, and a list of common device names where you are likely to find the drawer. (ie. DF0:, DH0:, RAM:)

Generate

This option allows you to make a quick linear path from the current camera position to the current target position. This is most useful for generating simple straight-line paths for animations. When you select this option Vistapro asks for the name of the Script file to generate. It then asks for the number of frames. If the camera is 1000 meters from the target and you select 100 frames, the camera will move 10 meters closer to the target in each frame. The Bank, Heading, and Pitch will remain constant (the camera will continue to point at the target). If you select the name of an existing file Vistapro will ask you if you want to delete the file or abort the operation. We recommend putting Script files in the Script subdirectory, usually DHO:VISTAPRO/SCRIPT.

Create

The Create menu item allows you to make a new script. When Create is selected, Vistapro will display a file requester, from which you can select the device where you want to save the script, the drawer you want to put the script in, and the name of the script. If you attempt to create an existing file, Vistapro will overwrite that file. After the script name is entered, Vistapro will create a blank script file and open it for use with the Add option.

Open

Open will retrieve a previously created file for appending new frames. When Open is selected, Vistapro will display a file requester, from which you can select the script to open.

Add

Add will append the current camera and target positions to the script that is currently opened.

Preview

The Preview menu item allows you to see the path that your script will follow along the topographical map. When selected, Vistapro will display a file requester, from which you can select the script to preview. After selecting the script, you will be given a choice of previewing in 2-D or 3-D mode. In 2-D mode Vistapro will just draw a sequence of dots on the topographic map to indicate each camera location (one dot for each frame). In 3-D mode Vistapro will render a real-time, 3-D wire frame preview in the topographic map area.

Execute

Execute will cause Vistapro to execute a selected script, creating a picture for every frame in the script file. When Execute is selected, Vistapro will display a file requester, from which you can select the script to execute. After the script is selected, Vistapro will display another file requester for a base' picture file name. It saves pictures as the base name, plus a 5 digit number. For instance, if you supply "Pic." as the base name, Vistapro will save the pictures as Pic.00000, Pic.00001, Pic.00002, and so on.

Anim Mode

IFF

In IFF mode Vistapro produces an IFF file in the selected display format for each frame. It then spawns the "Execute" program to execute an AmigaDOS script (filename = DoFB.iff) which can do whatever you want. Remember that each file will have the base name plus a 5 digit frame number.

IFF24

In IFF24 mode Vistapro produces a 24 bit IFF file. This file will be in the resolution selected from the Display Menu. It then spawns the "Execute" program to execute an AmigaDOS script (filename = DoFB.iff24) which can do whatever you want. Vistapro displays the frame in lo-res/ non-interlace/ non-overscan format so you can see what you are generating. Remember that each file will have the base name plus a 5 digit frame number.

RGB

In RGB mode Vistapro produces 24 bit RGB files as used by the Mimetics framebuffer program. It then spawns the "Execute" program to execute an AmigaDOS script (filename = DoFB.rgb) which can do whatever you want. Vistapro displays the frame in lo-res/ non-interlace/ non-overscan format so you can see what you are generating. Remember that each file will have the base name plus a 5 digit frame number.

VANIM

Vistapro does not have direct support for the Amiga's standard ANIM format. You must use some other ANIM file generator to convert Vistapro's IFF files into ANIM files.

Vistapro does have direct support for our own proprietary animation format (Vistapro ANIM, or VANIM). Our format has both benefits and drawbacks.

The benefits are:

- 1) VANIM animations limit you to available disk space, not memory size. If you have a 800MB disk you can play an 800MB animation.
- 2) Each frame has its own color palette.
- 3) You can play animations backwards, or forwards, single-stepped, jump-stepped, etc.

The drawbacks are:

- 1) The animation files are larger than the regular Amiga ANIM format, about 2x as large.
- 2) Playback of animations with large frame sizes is slow, as little as two frames a second.

Vistapro always produces a file with a list of the picture names that it generates. The name of this file is PICBASE.list where PICBASE is the base picture name selected by you when you started the animation script. For example if you select DH0:ANIM/PIC as the base name, Vistapro would produce a sequence of pictures with the following filenames:

```
DH0:ANIM/PIC.00000
DH0:ANIM/PIC.00001
DH0:ANIM/PIC.00002
```

and the file DH0:ANIM/PIC.list would contain those full names. This is the format used by the popular MakeAnim program. If you are creating an animation in RGB mode, the filenames would be:

```
DH0:ANIM/PIC.00000.ORED
DH0:ANIM/PIC.00000.OGRN
DH0:ANIM/PIC.00000.OBLU
DH0:ANIM/PIC.00001.ORED
DH0:ANIM/PIC.00001.OGRN
```

```
DH0:ANIM/PIC.00001.OBLU
DH0:ANIM/PIC.00002.ORED
DH0:ANIM/PIC.00002.OGRN
DH0:ANIM/PIC.00002.OBLU
```

Display Menu

Image Size

Vistapro allows you to render images of any size from very small (16 x 10) through very large (4096 x 3000). Very large images of course will take lots of memory, and may not be able to be displayed on the Amiga due to limits on the amount of CHIP ram available. The memory needed to render an image can be calculated by taking the image width in pixels, divide by 8, multiply by the height in scan lines and multiply by 24 plus the number of bitplanes of the displayed image. Add this to the 1.5 megs of other memory that Vistapro requires (plus any extra for Large or Huge landscapes) and you have a close estimate of what Vistapro requires to render an image of your desired size.

Select Image Size from the Display menu. You will see a requestor asking you for the width of your image. Click on the string gadget in the requestor (the little black box with the number inside), press the Del (delete) key several times, and then type in the width that you desire. A standard Hi-Res screen is 640 pixels wide, while Lo-Res is 320 pixels wide. Standard widths can be set with the Lo-Res, Hi-Res, Ham and Overscan menu selections from the Display menu. When you have entered the desired value, press the Return key, and click the left mouse button over the OK button on the requestor. Next you will see a requestor with a string gadget asking for the height of your image. Follow the instructions above when you entered the width in the width requestor. A standard non-interlaced screen is 200 lines high, while an interlaced screen is 400 pixels high. Standard heights can be set with the Interlace and Overscan menu selections from the Display menu. When you have entered the desired value, press the Return key, and click the left mouse button over the OK button on the requestor.

Note : Remove the section in the Project menu under the Save IFF menu item called Full24. This is no longer relevant.



DISPLAY MENU

Low Res

When you select the Low Res menu item, you will be asked if you want to change the image size. If you answer yes, the image width will be changed to 320 pixels, unless Overscan is also selected, in which case it is 352, 368 or 384 pixels. If you answer no, the image width will remain unchanged. This mode allows for 32 different colors to be used to draw the display. Pixel dithering can be used to increase the apparent color resolution and to add texture to the image.

HalfBrite

Uses the Amiga HalfBrite capability to increase the number of available colors to 64. Some early (Amiga 1000) machines may not have this capability. The screen resolution is the same as with Low Res.

Hi Res

When you select the Hi Res menu item, you will be asked if you want to change the image size. If you answer yes, the image width will be changed to 640 pixels, unless Overscan is also selected, in which case it is 704, 736 or 768 pixels. If you answer no, the image width will remain

unchanged. This mode allows for only sixteen colors to be used in drawing the screen. Pixel dithering can be used to increase the apparent color resolution.

HAM

HAM stands for Hold and Modify, a means by which you can simultaneously display many more colors than the Amiga can normally support. When you select the HAM menu item, you will be asked if you want to change the image size. If you answer yes, the image width will be changed to 320 pixels wide, unless Overscan is also selected, in which case it is 352, 368 or 384 pixels. If you answer no, the image width will remain the same. HAM works in both interlace and non-interlace modes. In HAM mode, up to 4096 colors can be displayed simultaneously. Pixel dithering can still be used, but it may not improve the image.

DCTV

If you select the DCTV menu item, Vistapro renders directly to the DCTV screen. This allows you to see your rendered images without saving to an IFF24 file first. Of course, you need a DCTV to use this option. Pixel dithering is still available when in DCTV mode. Vistapro uses DCTV's 4 bit plane mode.

HAM-E

If you select the HAM-E menu item, Vistapro renders directly to the HAM-E screen. This allows you to see your rendered images without saving to an IFF24 file first. Of course, you need a HAM-E to use this option. Vistapro uses HAM-E's highest resolution mode.

Interlace

Normally an NTSC monitor displays the odd scan lines followed a 30th of a second later by the even scan lines. In non-interlace mode, the Amiga displays the same data for both the odd and the even lines, giving an effective vertical resolution of 200 pixels, except with Overscan where the maximum resolution is 242 pixels. In interlace mode, all 400 scan lines contain different data, giving a resolution of 400 pixels in the vertical direction, except with Overscan where the resolution is always 484 pixels. When you select the Interlace menu item, Vistapro will ask you if you want to change the image size. If you answer yes, the image height will be set to 200 if Interlace is off and Overscan is deselected, 242 if overscan is selected. If Interlace is on, then the height will be set to 400 if overscan is deselected and 484 if overscan is selected. If you answer no, then there will be no change in the image height.

Overscan

Normally the width of an Amiga screen is 320 pixels in Lo Res mode, and 640 pixels in Hi Res mode, and the height is 200 pixels in non-interlace mode and 400 pixels in interlace mode. With Overscan, the edges of the visible screen are also used, giving a Lo Res width of 352, 368 or 384 pixels, a Hi Res width of 704, 736 or 768 pixels, a non-interlaced height of 242 pixels, and an Interlaced height of 484 pixels. The outer edges of the image will not be visible, since they are in the far overscan region. This mode is similar to what you usually see on TV.

Off

Turns off Overscan display mode.

704

Sets the vertical overscan to 704 pixels in interlace mode, and 332 pixels in non-interlace mode.

736

Sets the vertical overscan to 736 pixels in interlace mode, and 368 pixels in non-interlace mode.

768

sets the vertical overscan to 768 pixels in interlace mode, and 384 pixels in non-interlace mode.

Firecracker

If you have a Firecracker24 display enhancer board, you will be able to select from the following submenu items. If you do not have this board, Vistapro will detect this and the Firecracker menu item will be ghosted. The firecracker screen will always be 768x482 pixels at 24 bits per pixel. The image size will be as you have selected previously with the Display Menu. If the image size is smaller than 768x482, then the image will be rendered in the upper left corner of the screen. If the image size is larger than 768x482, then only the upper left portion of the image will be displayed.

If either of the Firecracker modes is enabled, Vistapro will render directly to the Firecracker screen. You will see each triangle being drawn as Vistapro is rendering! Vistapro will not automatically redraw the selected native Amiga mode screen after rendering; we assume you would rather look at just the Firecracker image and not waste time redrawing on the Amiga screen. You can still redraw the Amiga screen manually by pressing the redraw button.

Off

When the Firecracker, OFF submenu item is selected, automatic rendering to the Firecracker 24 display enhancer board is disabled.

1 Monitor

If you are using one monitor to display normal Amiga text and graphics, as well as Firecracker24 images, you should select this submenu item. Vistapro will switch control over to the Firecracker while rendering, and return control to the Amiga when you are finished viewing it.

2 Monitors

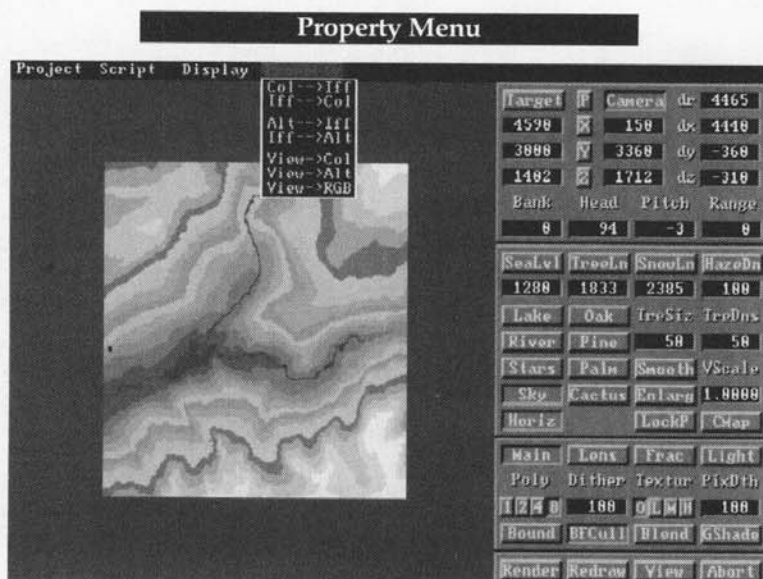
If you have an additional monitor attached to the Firecracker other than the monitor that you normally use with your Amiga, you should select this submenu item. Vistapro will direct the output to the Firecracker when the image is being displayed. You will continue to see the Vistapro control panel screen on the Amiga's monitor.

Background

You can now have Vistapro load a 24 bit IFF file as the background before rendering. For example, you could load a picture of a cloudy sky as a background, turn off the Sky function in Vistapro and then render the landscape. The clouds will be visible anywhere that the landscape doesn't overwrite them. The IFF24 file should be 768x484 pixels.

Foreground

You can now have Vistapro load a 24 bit IFF file as the foreground after rendering. For example, you could load a picture of a dashboard as a foreground. Any pixel that is black (R=0, G=0, B=0) in the IFF24 file is considered transparent. Any non-black pixel will overwrite the rendered image. You can create 24 bit IFF background and foreground images from regular IFF files using the View->RGB function. You can also use ASDG's excellent Art Department Professional package.



PROPERTY MENU

For a complete description on how to use the following functions, please see the ReadMe.tutorial file on the Vistapro Disk1.

Col ->Iff

Color table to IFF. This option outputs Vistapro's internal table of polygon colors as an IFF file.

With the addition of Col->IFF (and IFF ->Col), you can now place individual trees, rivers, cliffs, etc. anywhere you want. When Vistapro renders an image, it uses thousands of polygons to produce the image. Internally each polygon is assigned a color which relates to the physical features of the landscape, for example, shades of green for trees, blues for water, whites for snow, etc. These colors are for internal representation. When the image is actually rendered, the colors specified with the CMap Palette are the ones used for the picture. When the Col->IFF option is selected, Vistapro saves its internal color table to an IFF file, which can then be loaded into a paint program and modified. (Deluxe Paint works quite well. We recommend using the 320x200 LoRes mode.) For example, to add a row of trees to a landscape, you would:

- 1) Load Vistapro DEM file into Vistapro
- 2) Adjust tree line, snow line, etc.
- 3) Select Col->IFF from the Property Menu. Select name for output file. Answer "OK" to "Need to calculate..." requestor if it pops up.
- 4) Start up DPaint and load the file created in step 3.
- 5) Using the color green, draw a line on the landscape.
- 6) Save the IFF picture.
- 7) To load the new colors onto the landscape, from Vistapro select IFF-> Col and specify the file given in step 3.
- 8) Render as usual.

Since the colors that appear in the IFF file represent the terrain types assigned to each polygon within Vistapro, and not the actual colors of the rendered image, they will always be the same.

The colors are assigned as follows:

#	color	terrain type
0	black	not used
1	white	not used
2 – 6	blues	Water1 – Water5
7	tan	Beach
8 – 11	browns	Tree1 – Tree4 without trees
12 – 15	greens	Tree1 – Tree4
16 – 19	tans	Bare1 – Bare4
20 – 23	whites	Snow1 – Snow4
24 – 27	grays	Cliff1 – Cliff4
28 – 31	RYGB.	Buildings

Buildings can only be created using this function.

Iff → Col

IFF file to color table.

This is the opposite of Col → Iff. It loads the selected IFF file back into Vistapro's color table. Vistapro will then render the landscape with the terrain types that were specified in the IFF file. WARNING: if you change a setting that requires re-coloring after loading the IFF file, the landscape will be re-colored, thus over-riding the loaded colors.

Alt → Iff

Altitudes to IFF file. It is similar to Col → Iff except that the altitude table is saved out as an IFF file. You then can use DPaint to modify the landscape – essentially you will be painting the contour map.

The colors used are as follows:

#	color	terrain type
0	blue	altitude 0, sea level
1 – 11	greens	lowest land altitudes
12 – 22	browns	middle altitudes
23 – 30	grays	highest altitudes
31	varies	used internally to indicate meters between each contour

The IFF file produced has only 31 colors to encode elevations so only crude editing of landscapes is possible using this function. When you load an IFF file back in, you will see discrete steps in the rendered image. You can use “Smooth” or “Fractalize” to reduce or eliminate the steps. For more concise editing of landscapes you should use TerraForm.

Iff → Alt

IFF file to altitude table. It is the reverse of Alt → Iff. It loads the IFF file back into Vistapro as a topographic map. It is suggested that you use “Smooth” or “Fractalize” to reduce or eliminate the steps due to the limited number of altitudes encoded in the IFF file. Note that color 31 is used to indicate the scaling of each step i.e., each step is N times the value indicated by color 31. N is calculated as follows:

$$N = 256 * \text{Red} + 16 * \text{Green} + \text{Blue}$$

If color 31 is Red=0, Green=1, Blue=5 then N is $0*256 + 1*16 + 5$, or 21. So Color 0 will represent 0 meters, Color 1 represents 21 meters, color 2 represents 42 meters....

View → Col

Convert the current image on the View screen into Vistapro’s internal polygon color table. The colors used in the image are used on the polygons when Vistapro renders. The image is scaled (squished or stretched) to fit onto the full landscape area.

View -> Alt

This converts the current image on the View screen into altitude data. There are two modes of operation "Intensity" and "Color".

In "Intensity" mode the intensity of each pixel is converted into an altitude. The darkest pixels get the lowest altitudes; the lightest pixels get the highest altitudes.

In "Color" mode the color numbers are translated into altitudes. The actual colors mean nothing. Color 0 gets the lowest altitude, color 1 is a little higher ... color 31 is the highest.

The image is scaled (squished or stretched) to fit onto the full landscape area.

This function works properly for LoRes, HiRes and HalfBrite modes. HAM is not supported and will give unpredictable results.

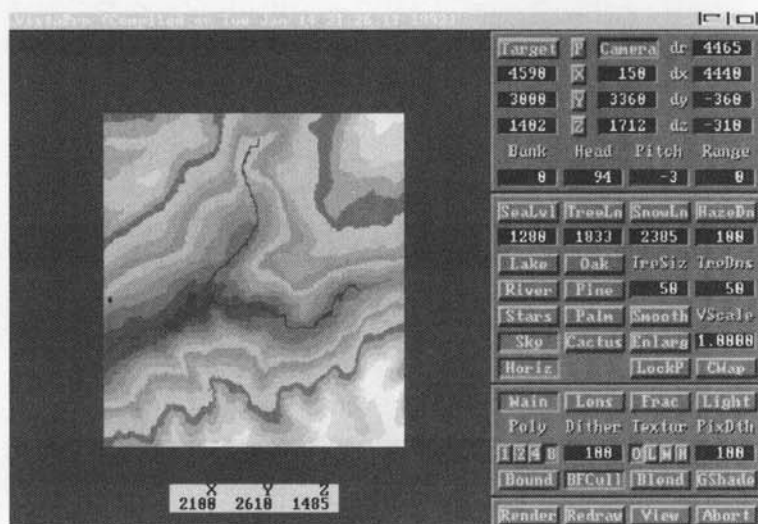
View - > RGB

This converts the current image on the View screen into the internal 24 bit virtual frame buffer. It is useful for converting IFF files into 24 bit IFF for the BackGround and ForeGround functions. The View image is scaled to fit the 768x484 virtual frame buffer. For instance a 320x200 IFF image is enlarged to 768x484 to fit the virtual frame.

This function works properly for LoRes, HiRes and HalfBrite modes. HAM is not supported and will give unpredictable results.

CONTROL PANELS

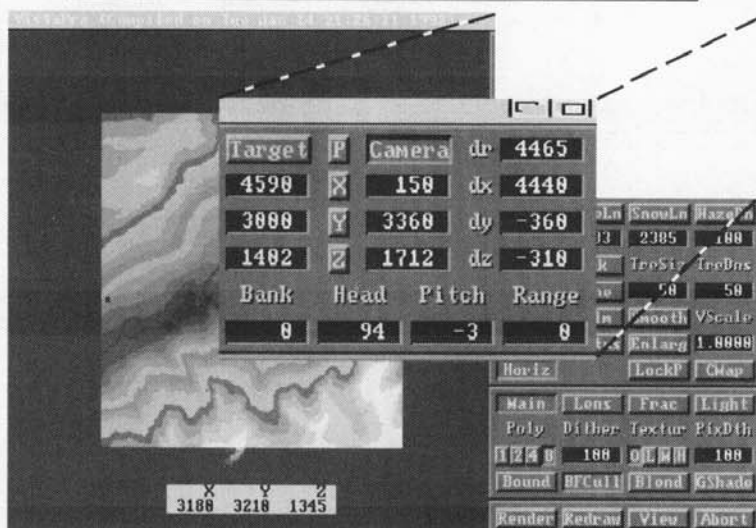
The Vistapro Control Panels are split into four main sections, which we shall call the Upper, Middle, Lower and Bottom Control Panels. In addition, there is a Color Control Panel that you can access by clicking on the CMap button on the Middle Control Panel.



CONTROL PANELS AND TOPO MAP

The map in the window represents the landscape area you loaded into Vistapro. The small "+" symbol on the map is the target. The small "□" symbol is the camera.

UPPER CONTROL PANEL



UPPER CONTROL PANEL

Target

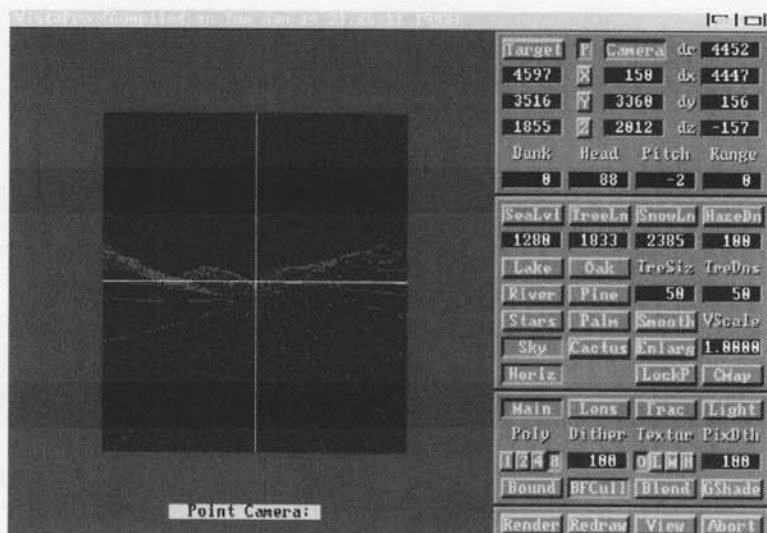
The target represents the point at which you are aiming the camera. Its location is measured in meters from the lower left hand corner of the topographic map and in meters above sea level. After selecting the Target button on the Control Panel, you can place the mouse pointer anywhere over the landscape and click the left mouse button, setting a new target position in the X and Y direction. The Z, or height value, is set to the elevation of the landscape at that X-Y coordinate. That is, the Z value in the Target represents the actual elevation of the landscape at that point. As an alternative, one can place the target precisely by entering locations directly into the X, Y and Z value windows. To change a value, select the appropriate value window by clicking the left mouse button in the value window. Use normal editing techniques to change the window values. (Backspace, delete, etc.) You may also delete the entire contents of the window by using a combination of the right Amiga key and the X key. This works in all the value windows in Vistapro. Make sure to press the return key after entering a value, or Vistapro will not register the change. See also Locking Functions.

Camera

The Camera represents the location of a hypothetical camera used to take a scenic picture. Its location is measured in meters from the lower left hand corner of the topographic map and in meters above sea level. The X coordinate is from left to right on the topographic map. The Y coordinate is from bottom to top of the topographic map, and the Z coordinate is in meters above sea level. Select Camera on the Control Panel. By placing the pointer anywhere over the landscape and clicking the left mouse button, you can select a new Camera position in the X and Y direction, and the Z or height value changes with the elevation of the landscape. The Z value in the Camera is set to an elevation 30 meters above the landscape. Alternatively, one can place the Camera precisely by entering locations directly into the X,Y and Z value windows. To change a value, select the appropriate value window by clicking the left mouse button inside the value window. Use normal editing techniques to change the window values (backspace, delete, etc). Delete the entire contents of the window by using a combination of the right Amiga key and the X key. This works in all the value windows in Vistapro. Make sure to press the return key after entering a value, or Vistapro will not register the change. See also Locking Functions

Locking Functions

Other tools that you can use with both the Camera and Target functions are the X, Y and Z locks. You can use the locks when you want to restrain the target or camera from moving in one or more directions. For instance, if you want to move the Camera to a new location on the landscape without changing its altitude, you could depress the "Z" lock and then click on a new Camera location. You will see that the X and Y coordinates of the Camera have changed but that the Z value has remained the same. Of course there are two other ways of achieving this same result: you could simply type the new X and Y locations into the Camera X and Y string gadgets, or you could click the mouse on the new Camera location (with the Z lock not set) and then type in the desired altitude. Vistapro will restrain both the Camera and Target X,Y, and Z values, as long as the locks are depressed.



PERSPECTIVE VIEW

P

The P button shows you what the camera sees in a wireframe perspective. This is useful for getting a preview of the features your picture will contain. While in the wire-frame preview mode you can rotate (point) the camera by clicking where you want the camera to point to in the preview area. For instance, if the camera is pointing at the top of a mountain and you would rather look at the base, place the mouse pointer at the base of the mountain and click the left mouse button. Vistapro will rotate the camera and render the new wire-frame view.

You can also adjust the focal length of the camera lens by pressing the up-arrow key to zoom in a little or the down-arrow key to zoom out a little. Each time you press the key, the camera will zoom in or out a little more.

While in the 3-D preview mode you can not access the control panel or the menus. To exit wire-frame preview mode you can click anywhere outside of the wire-frame preview area, and the topographic map will return.

dR

DR displays the distance in meters between Camera and Target. This distance is the radius from the target. You can use this value to step closer to or away from the target, just as one might do when taking a photograph.

When you type in a new distance value, Vistapro will change the Camera's X, Y, and Z coordinates to match the desired distance as well as it can. The Bank, Heading, and Pitch values will not change.

dX

DX displays the difference between Camera and Target X dimension values. The user can change this value by entering a new value in the DX numerical gadget. Changing this value moves the camera to reflect the new distance. The Heading and Pitch of the Camera may also change to keep the Camera pointed at the Target.

dY

DY displays the difference between Camera and Target Y dimension values. The user can change this value by entering a new value in the DY numerical gadget. Changing this value moves the camera to reflect the new distance. The Heading and Pitch of the Camera may also change to keep the Camera pointed at the Target.

dZ

DZ displays the difference between Camera and Target Z dimension values. The user can change this value by entering a new value in the DZ numerical gadget. Changing this value moves the camera to reflect the new distance. The Heading and Pitch of the Camera may also change to keep the Camera pointed at the Target.

The following descriptions use an airplane as a model to explain themselves.

Bank

Bank controls the rotational angle of the plane (camera) along its longitudinal axis. Imagine an airplane floating in space. You can describe the longitudinal axis as an invisible line drawn from the tail of the airplane, through the middle to the nose. Any rotation that causes one wing to dip and the other to raise is a rotation around the longitudinal axis. A positive rotation around this axis would cause rotation in a clockwise fashion. The left wing would raise, and the right wing would lower. Note that when the plane (camera) rotates clockwise, the view that is rendered will appear to have rotated in the opposite direction.

Head

Heading describes the rotational angle of the camera around its Z axis relative to the landscape. Imagine an airplane floating in space. You can describe the Z axis as a line drawn from the top of the airplane through its middle to its bottom. Any rotation around this axis causes the airplane to turn right or left. A positive rotation causes the airplane to turn right.

Pitch

Pitch is the rotational angle of camera around its wing axis. Once again, imagine an airplane floating in space. A line drawn from the left side of the airplane through the wings to the right side, describes the wing axis. Any rotation around this axis causes the airplane to move the nose either up or down, with a positive rotation causing the nose to go up.

Range

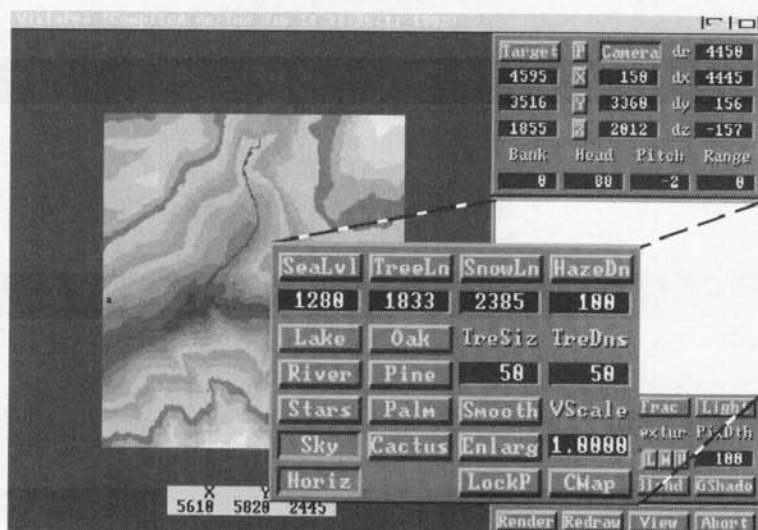
The Range numerical gadget causes Vistapro not to render parts of the landscape that are near or far from the camera. If the value entered is positive, Vistapro will not render parts of the landscape farther away than the value (in meters). If the value is negative, Vistapro will not render any part of the landscape closer than the equivalent positive value. A value of 0 turns off this function.

For example, entering the value 1000 will cause Vistapro not to render any part of the landscape more than 1000 meters away; -1000 will cause parts of the landscape less than 1000 meters not to be rendered. 0 causes Vistapro to render all visible parts of the landscape (the Range function is disabled). Note that the range is relative to the camera's location so that it will follow the camera around during an animation.

The Range function can be quite useful for testing script files to be sure that the camera doesn't run into any nearby obstacles. Set the Range value to something like 500 meters, and run a script. Frames will generate very quickly since far fewer polygons are being drawn.

We don't know of any good reason to use the negative values, but it was easy to implement so we tossed the function in!

MIDDLE CONTROL PANEL



MIDDLE CONTROL PANEL

SeaLvl

By setting the sea level, you can sink the landscape into the sea to that level. All points below this level become sea level (0 meters), and all points above this level have that value subtracted. For example, if you select 1000 meters as sea level, all points below 500 meters will sink to 0, 2000 meters will sink down to 1000 meters, 3000 meters will sink to 2000 meters, etc.

Vistapro will ask if you would like to erase rivers and lakes (if present) when it generates a new sea level, and if you would like to add waves onto the ocean. Vistapro will need to color and shade the landscape again.

Vistapro has a button for selecting sea level. You click on the Sea button and then select the level by clicking on the topographic map. You can still specify the sea level explicitly by typing the value into the string gadget immediately below the sea button.

TreeLn

You can use the Tree level button to set the timber line, the altitude above which there are no trees. The timber line is a "fuzzy" value. Just as in nature, some trees will appear above the tree line and some bare areas will appear below it. Vistapro's AI rules will compensate for features of the landscape. Trees generally will not cover the face of a cliff even though the entire cliff may be below the tree line. Trees may grow upward into a valley (more water is available at the bottom of a valley) and a ridge will tend to be devoid of trees (ridges tend to dry out from exposure to the wind).

If one of the "Tree" type buttons ("Pine", "Oak", "Palm", or "Cactus") is not selected, Vistapro will not actually draw the trees, it will just use the under tree colors to color the ground. (The under tree colors are the -Tree1 through -Tree4 on the ColorMap.)

You can use the TreeLn button to select the tree level. Depress the TreeLn button and then click on the topographic map at a location which has the desired altitude. You may also numerically specify a tree level by typing a value into the string gadget located below the TreeLn button.

Vistapro has four types of vegetation that it can draw while rendering. Vistapro draws the trees only if one of the tree type buttons (Pine, Oak, Palm, or Cactus) is depressed.

You can select several tree types at the same time. They will be rendered by elevation, with Pine being at the highest elevation, Cactus next, followed by Oak and Palm.

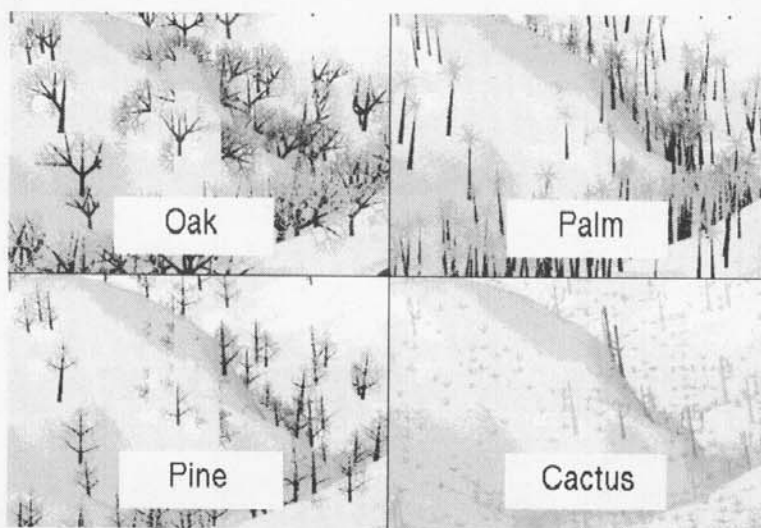
After selecting the tree size (or accepting the default) select the type by pressing the Pine, Oak, Palm or Cactus button. Pine trees will have roughly triangular shapes like a Christmas tree. Oak trees will have roughly round shapes. Palm trees will have a tall trunk with leaves branching off of the top. Cactus will look somewhat like Saguaro cactus with patches of sagebrush.

Trees may be drawn anywhere that TREE1 through TREE4 (see CMap section) colors are used. In addition the number of trees drawn is affected by the TreDns (Tree Density) setting.

Trees are drawn using TREE1 through TREE4 colors, plus a small randomizer so that they are not all the same color. The trunks of the trees are drawn

in a non-user-selectable shade of brown. The ground underneath trees is drawn as shades of GROUND1 through GROUND4.

Trees can take a very long time to draw. Depending on how many trees are drawn, an image with trees may take 2 to 20 times as long to render as the same scene without trees.



TREE TYPES

Oak

Adds Oak-like fractal trees to the image in areas below the Tree line.

Pine

Adds Pine-like fractal trees to the image in areas below the Tree line.

Palm

Adds Palm-like fractal trees to the image in areas below the Tree line.

Cactus

Adds Saguaro Cactus and Sage Brush to the image in areas below the Tree line.

TreSiz

The size is specified by the numerical string gadget at the center of the requestor. You must select the size before the type since pressing either of the type buttons will close the requestor. Good sizes range from 20 to 50 meters. The default size of 50 meters is admittedly a bit large, but we find it preferable to draw a smaller number of large trees rather than a large number of small trees. Very small trees may appear too sparse; very large trees will be distorted or overwritten by subsequent polygons of the landscape.

TreDns

TreDns (Tree Density) controls how many of the polygons that are assigned TREE1 through TREE4 colors will also have trees drawn on them. Useful values range from 0 to 256 with low values giving low tree densities, high values giving high densities. Values below 0 are treated the same as 0, values above 256 are treated the same as 256. A value of 128 will result in one half of the TREE colored polygons having trees rendered. To change the Tree Density value click on the string gadget immediately below the TreDns label and type in a new value. Press RETURN when finished. Note: the higher this value, the longer the image will take to render!

SnowLn

The Snow Level is the lowest elevation in meters where Vistapro will cover the landscape with snow. The AI (Artificial Intelligence) rules in Vistapro use this value to calculate where to use the snow colors. Vistapro will compensate for cliffs, ridges, valleys, rivers and lakes in an attempt to mimic natural snow cover. Snow colors don't have to be the colors of snow. You can use any colors you like. Just keep in mind that the snow colors will be placed on the landscape following the AI rules for snow. For instance, you can set the snow colors to shades of grey to make mountain tops look like barren rock. The barren rocky areas will appear to flow down into valleys just as snow would.

You can use the Snow button to select the snow level. Depress the Snow button and then click on the topographic map at a location which has the

desired altitude. You may also numerically specify a snow line by typing a value into the string gadget located below the Snow button.

HazeDn

In the real world, the farther away an object is, the more it is occluded by the atmosphere. The haze function in Vistapro simulates this effect adding to the three-dimensional feel of the resulting image. You can specify how thick the haze is by changing the Haze value in Vistapro. (You can also change the color of the haze – see chapter 6, Color Control Panel.) You enter the haze value by entering a number in the string gadget below the Haze button. A value of 0 will completely eliminate the haze effect; small values (below 100) will give very little haze, medium values (100-1000) will give medium haze and high values (over 1000) will create very thick fog.

You can also “automatically” calculate the haze value by pressing the Haze button. Vistapro will generate a value based upon the distance between the Camera and the Target. The closer the two are, the thicker (higher value) the haze. We tried to arrange it so that setting the haze value this way generates haze that first becomes significant at distances about the same as that between the Camera and Target.

Lake

Lake Generation adds lakes to a landscape. Select Lake on the Control Panel. Then, using the mouse, place the pointer on the landscape at the lake level desired, and click the left mouse button. Example: if one places the pointer in a shallow valley at 2100 meters, water will begin to fill the valley until it reaches the 2100 meter mark, as it would in nature. If there is any portion along the edge of the valley that is below the 2100 meter mark, water will spill out of the valley and begin to flood other parts of the landscape. This may not be the desired effect, and it should be kept in mind when using the Lake function. If there is uncertainty about the height of any portion of the landscape, you can move the mouse pointer around any suspect areas and watch the Z value on the status line to find the lowest point in the pass to determine the maximum safe altitude for creating the lake. Lake generation can be aborted by positioning the mouse over the Abort button and clicking the left mouse button.

To create a lake, press the Lake button and then click on a starting point on the topographic map. You will see the lake being created on the topographic map in black. Once the lake has been completed the black lake will be redrawn in blue.

After selecting the Lake button and clicking on the lake's starting point, Vistapro pops open a requestor indicating the level to which the lake will fill (the altitude of the point you clicked on). You may change the level to a higher value if necessary.

River

Vistapro's River function creates rivers which flow downhill from the selected starting point. If a river reaches a depression it will slowly fill it (creating a pond or lake) until the lake overflows. The river will continue flowing down hill until it reaches the ocean or the edge of the topographic map. Although you can always fill a lake using the river function and waiting until the lake fills up, it is generally faster to fill lakes using the Lake function.

To create a river, press the River button and then click on a starting point on the topographic map. You will see the river being created on the topographic map in black. Once the river has been completed, the black river will be redrawn in blue.

If you start a river on an existing river or lake, the river will continue until it reaches sea level or the edge of the topo map. A new river (one started where there was not a river or lake to start with) will also stop at any existing water. This allows you to create many tributaries to a river without the main river getting very wide and deep. Of course, if you want the main river to get very wide, just start a new river on top of the old one as many times as you like. It will grow wider with each iteration.

You generally will want to start rivers at the head of a valley, but it is possible to start a river anywhere on the topographic map.

River generation can be stopped by pressing the Abort button. This will stop the additional flow of the river, but will not erase the part that has already been generated.

Smooth

The Smoothing function smooths or erodes the landscape, removing the harsher, more jagged edges of hills and mountains. Smoothing often improves the appearance of landscapes, and it is especially useful when dealing with fractal landscapes. You should use the smoothing function sparingly with DEM files if data integrity is important, as it distorts data. Pressing the Smooth button from the Control Panel will invoke the smoothing function. This is a repeatable, refining function, meaning that it can be run over and over again, smoothing (eroding) the landscape more on each pass. Smoothing is also used to obtain snow covered peaks. Because of the design rules of the AI algorithms, and as is also true in nature, it is very rare that the summits or peaks of mountains are completely snow covered. It is more often the case that due to the steep nature of the cliff faces and other contributing aspects, such as wind and snow weight, snow does not cover the peaks of most mountains. However, since it may be desirable artistically to create a completely snow-covered mountain, smoothing the mountains will often give this effect.

CMap

You can select the CMap button to display and activate the Color Control Panel. See Color Control Panel for more information.

Stars

Vistapro can generate stars in the night sky. To enable this feature, select the "Stars button from the main control panel. You will be asked if you would like double width stars, and then double height stars. This will help the stars to be brighter and more visible in LoRes modes. To deselect the stars feature, re-select the Stars button. When you enable stars, Vistapro displays them in the sky whenever it renders a scene. Vistapro automatically changes the sky color to black, and changes the haze and sky-haze colors to dark shades. The star patterns are randomly generated and bear no resemblance to the real night sky as viewed from earth.

Stars may not show up well in lo-res and HAM modes (because of antialiasing), unless you use double width and/or double height stars.

Some recommended settings with stars enabled:

Item	Red	Grn	Blu
Sky	00	00	00
Haze	10	10	10
SkyHaze	10	10	20
Haze value	(250)		

For a sundown effect:

Item	Red	Grn	Blu
Sky	00	00	30
Haze	10	10	10
SkyHaze	60	00	00
Haze value	(250)		

Sky

The Sky button is used to turn the rendering of the sky on and off. When the Sky button is depressed, Vistapro renders the Sky. When it is not depressed, the sky is not rendered. If you have an alternate image that you would like to load in place of the sky, you would turn the sky off before rendering, and use the Background function to load a backdrop.

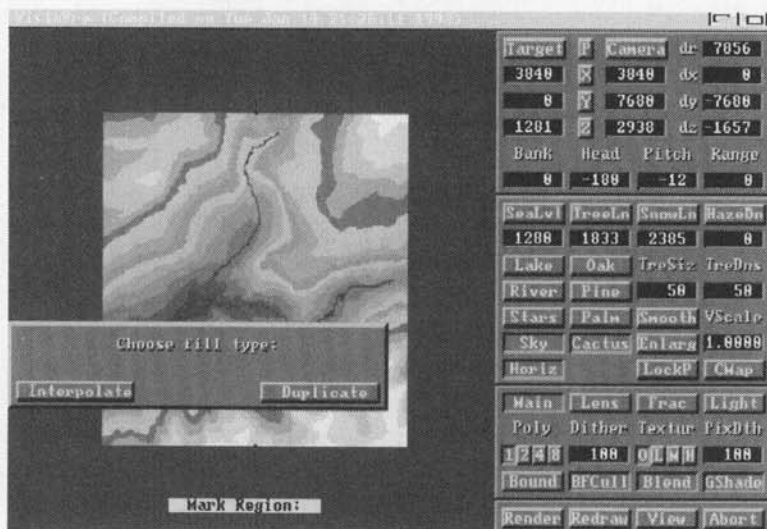
Horiz

Technically, the horizon is that line in the distance where the sky touches the ground or ocean. In order to create a horizon in the distance, Vistapro draws a large disk from the camera out to the horizon. We refer to this disk as the "horizon" The Horiz button is used to turn the rendering of the horizon on and off. When the Horiz button is depressed, Vistapro renders a horizon over which the landscape is then rendered. When loading a background, this can be used to eliminate the horizon line that is visible when you look off the edge of a landscape.

LockP

The LockP button locks the color palette. Normally, Vistapro generates the best color palette that it can for each image, based on the terrain it is rendering. This can cause some flickering in animations as the same areas slightly change color from frame to frame. By locking the color palette, you guarantee that the colors will be consistent between frames of an animation. When you select the LockP button, the palette is locked at the current settings. You should generate a typical frame before locking the palette to ensure that the palette contains a reasonable cross-section of colors.

Enlarg



ENLARGE

The enlarge function allows you to select a portion of the landscape and enlarge it to fill the entire topographic area. The intermediate data points are either filled with the average of the points around them or filled with duplicates of the nearest point. To invoke this function press the Enlarg button. You will then see a box that follows the mouse cursor around the screen. Place the box over the section that you want to enlarge and press the left mouse button. Vistapro will open a requestor near the top of the screen asking you to select either the Interpolate (average) or Duplicate mode. Select the desired mode, and the area inside the box will be

enlarged to fit the entire topographic area. Any rivers, lakes, or oceans will be lost.

The differences between the two modes is best described by a diagram. Consider the side of a small hill viewed from a cross-section. In Interpolate mode the hill will double in size in all dimensions, and the side of the hill will remain smooth; in Duplicate mode the hill will also double in size, but it will become stepped:

Interpolate mode: "in between" data is the average of the points around it.

Duplicate mode: "in between" data is the same as the point near it.

VScale

Vistapro allows you to vertically re-scale any landscape. Typing a number into the scale string gadget will cause Vistapro to scale the landscape as requested. For example, if you type in 2.0, Vistapro will stretch the landscape out vertically so that mountains are twice as tall, etc. Values between 0.0 and 1.0 will cause Vistapro to flatten the landscape. Values below 0 cause the landscape to flip over (valleys become ridges, mountains become pits) before Vistapro scales them. The number typed in always results in a landscape that is that value times the original landscape. The user can save landscapes after scaling.

You can generate some interesting effects with the scaling function. You can flip landscapes upside down by using negative values. Scaling mountains so that the top will exceed 32767 meters and then scaling it back down to normal will result in mountains with big pits or calderas. Scaling to very large values can even cause several layers of this effect resulting in a mountain inside a collapsed mountain inside a collapsed mountain. Scaling mountains down until they are very small and scaling them back up will result in stepped mountains.

LOWER CONTROL PANELS

The Lower Control Panels consist of four separate Control Panels overlaid on a common space.

Main

The Main button enables and displays the Main Lower Control Panel. See Main Lower Control Panel for details.

Lens

The Lens button enables and displays the Lens Lower Control Panel. You can use this to select the type of lens the Camera is using. See Lens Lower Control Panel for details.

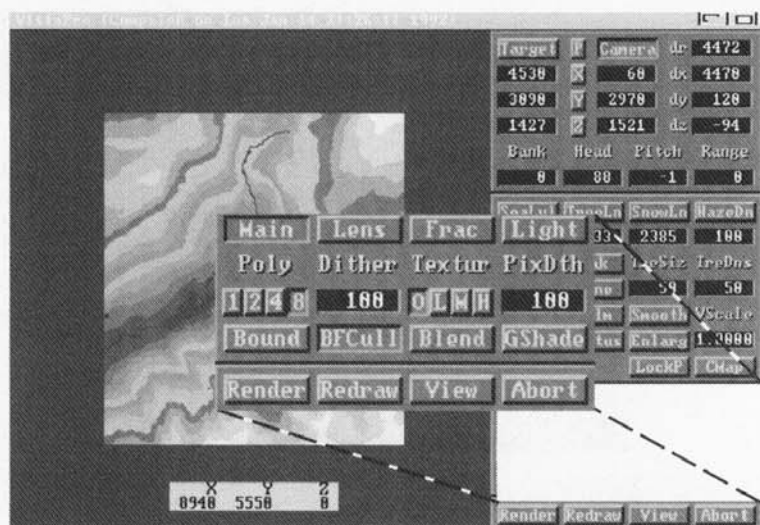
Frac

The Frac button enables and displays the Fractal Lower Control Panel. You should use this when generating random fractal landscapes. See Fractal Lower Control Panel for details.

Light

The Light button enables and displays the Light Lower Control Panel. You should use this when selecting the direction and intensity of the light source. See Light Lower Control Panel for details.

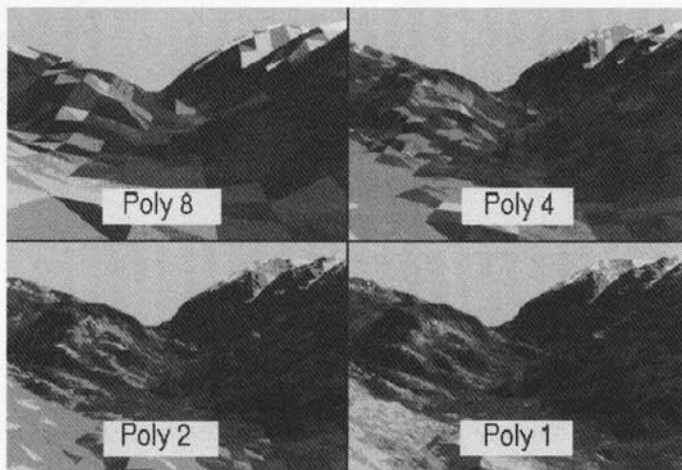
MAIN LOWER CONTROL PANEL



MAIN LOWER CONTROL PANEL

Poly

With a Small landscape Vistapro produces 131,072 polygons at its finest resolution. With a Large landscape, Vistapro will produce 4 times as many polygons (524,288), and with a Huge landscape, 16 times as many



SAMPLE POLY 1, 2, 4, 8 RENDERINGS

polygons (2,097,152). The Polygon Size function controls the relative coarseness of the landscape image. A size of 8 generates 1/64th as many polygons (1/8th on each axis) as a size of 1, and they are 64 (8 x 8) times as large. That is, a Small landscape can consist of 131,072 size 1 polygons, 32,768 size 2 polygons, 8192 size 4 polygons, or 2048 size 8 polygons. You can use the larger polygons to generate quick previews of landscapes. When you are happy with your camera and target placement, use smaller polygons. The smaller the polygons, the longer it takes to generate the image. The larger the polygon size selected, the less detail that will show up in the image, because Vistapro is displaying only a fraction of the full data. The lower resolutions (higher poly number, i.e. 4,8) are useful for quick test renderings to check for landscape color, light placement, and exposure settings.

Dither

Vistapro colors landscapes generally by altitude. The lowest altitudes are colored with TREE1 through TREE4 colors, middle altitudes are colored with BARE1 through BARE4 colors, the highest altitudes are colored with SNOW1 through SNOW4 colors. Each of the 130,000 triangles that make up the landscape is assigned a color based on its altitude and several other factors.

The Dither button sets the "fuzziness" of the division between color bands in Vistapro. A setting of 0 will make the tree-line and snow-line very sharp boundaries. The default setting of 128 gives a moderate amount of dithering of the colors. A large value like 1000 will make the colors so dithered that there is no visible relationship between altitude and color. To set this value, click the mouse pointer on the "Dither string gadget on the Main Control Panel. Change the number from the keyboard and press RETURN. Useful values range from 0 to 1000.

Textur

OLMH

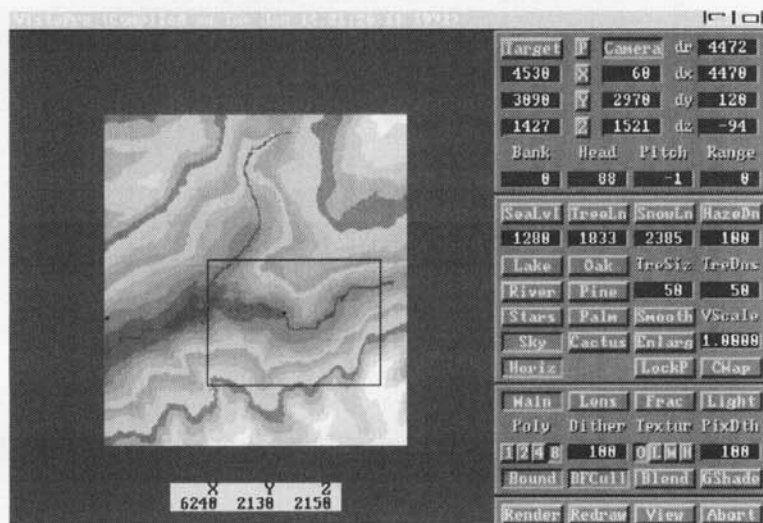
Vistapro can add additional texture to nearby polygons by breaking them up into smaller pieces and drawing each of the pieces as slightly different shades. This adds artificial detail to nearby areas. There are four different levels of detail, Off, Low, Medium and High. They are selected

by the O, L, M, and H buttons below the Texture label. The higher the detail level the longer a picture will take to render but the more detailed it will appear.

PixDth

Dithering at the pixel level increases the apparent number of colors in the display. Vistapro uses a dithering method which allows you to set the amount of dithering used within the display. It can be set anywhere from no dithering to so much dithering you can no longer recognize the picture.

Bound



BOUND BOX FUNCTION

The bounding function allows you to mark off a rectangular area of the landscape; Vistapro will then render only the parts of the landscape inside the bounded area. This is useful when you want to examine details in a small portion of the landscape or to eliminate parts of the landscape you know will not be visible.

To use this function, select the Bound button. On the topographic map, click the mouse pointer at one corner of the desired region. Move the pointer to the opposite corner — notice that a rectangle will follow the

mouse as you move it. Click on the second corner. A black box will be drawn on the topographic map to indicate the bounded area. To turn off the Bound function, click on the Bound button again. The button will pop up and the black box will disappear.

BFCull

Normally, with Vistapro's Camera placed over the landscape, the back side of a mountain will not be visible to the camera; only the front of the mountain (the part facing the camera) will be seen. Since the back of the mountain won't be visible, it makes sense not to render it. The BFCull button enables "Back Face Culling," a technique of detecting the back-faces and not rendering them.

Under some conditions you may need to see the back faces of objects. For instance, with the camera underneath the landscape, or with the camera in the blue area surrounding the topographic map, some back faces will be visible to the camera. You can disable back face culling under these conditions if you choose.

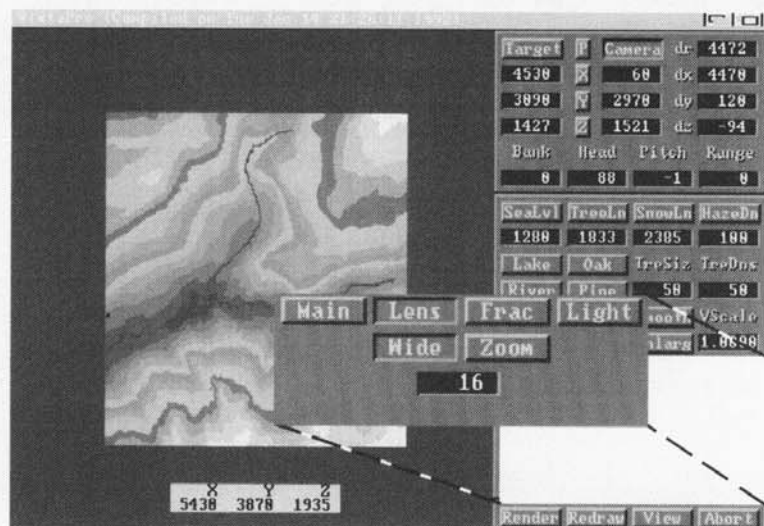
Blend

Blend helps reduce the coarse texture of distant parts of the landscape. If you select the Blend button, Vistapro will draw each polygon with a weighted average color of that polygon and the three polygons that border it. This reduces the aliasing of distant polygons. It also reduces the color saturation of polygons, so its use is optional.

Gshade

Gouraud shading produces smooth-looking surfaces without obvious triangles. It requires about 50% more rendering time. Gouraud shading gives a brush like feeling to the landscape, as if an artist painted it using oils, rather than the Amiga playing with numbers. Besides filtering out large polygons, it adds mood to the landscape. The foreground may appear blurry with Gouraud shading.

LENS LOWER CONTROL PANEL



LENS LOWER CONTROL PANEL

The camera lens feature represents the lens type of Vistapro's imaginary camera.

Wide

The wide angle lens gives a 90 degree field of view. It allows you to see a wide area with minimal spherical distortion. The wide angle lens has a zoom value (similar to the focal length of a real camera) of 16.

Zoom

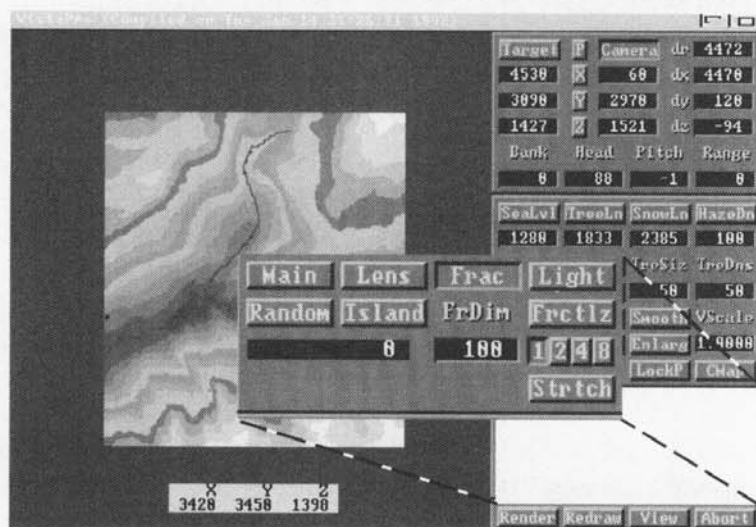
The Zoom lens has about half the field of view of the wide angle lens (about 45 degrees), or you may think of it as having twice the magnification. It allows you to zoom in on the target. Very little distortion will be noticeable. The Zoom lens has a zoom value of 32.

Zoom Value

The Zoom value is similar to the focal length of a real camera. It represents the width of the field of view or the amount of magnification. The lower the Zoom value the wider the field of view. The higher the Zoom value the narrower the field of view and the greater the magnification.

The lowest valid Zoom value is 1. This is an extremely wide angle lens with severe spherical distortion. Values below 8 are generally impractical but fun to try out sometimes. You can set the Zoom value to as high as 30,000 but such high numbers are only useful when the camera is very far from the landscape (a million meters or so). You will probably usually use Zoom values from 16 to 100.

FRACTAL LOWER CONTROL PANEL



FRACTAL LOWER CONTROL PANEL

Random

Random Landscape Generation allows creation of a vast number of completely artificial landscapes. Vistapro supports over four billion random fractal landscapes. Each different number in the fractal number window represents a different landscape. You can use both positive and negative numbers. Using a number such as -1,231,541 will create a different landscape than its positive counterpart 1,231,541. Select Random on the Fractal Lower Control Panel. Notice that a new number has appeared in the random seed window. The software will then proceed to create a new landscape. After a while, depending on the speed of the system running the program, a new landscape will appear. If this landscape is one which you may want to use again, be certain to write down the number so that you can recall it again, or save the landscape, using the Save Landscape, Vista DEM menu item. To recreate a desired landscape, simply reenter its number in the random seed window and Vistapro will create the same landscape again. This will conserve disk storage space. You may enter any number desired into the random seed window and explore landscapes in this fashion. Various methods include using special dates such as birthdays (minus hyphens or slashes,

i.e. 52262 not 5-22-62), holidays and anniversaries. Keep a list of numbers for those landscapes that prove to be interesting so that you can share them with other owners of Vistapro. Like the fingerprints of the four billion inhabitants of this planet, some Vistapro scenes may look similar, but, upon closer examination, each one is individual and distinctive. Fractal landscape generation is affected by the fractal dimension and fractal divisor settings.

Island

There are two modes for generating fractal landscapes, Island and Floating. In Island mode the altitude of the four edges of the fractal landscape are at the same altitude. This allows you to create islands by setting the sea level higher than this edge altitude. See the Sea function for details on its function. In floating mode, the four edges of the landscape are allowed to float – that is, they are allowed to vary in altitude. Floating mode landscapes look like they were clipped out of a larger area – similar to real-world DEM landscapes.

If the Island button is depressed fractal landscapes will be generated in Island mode, otherwise they will be generated in Floating mode.

FrDim

The FrDim value controls the Fractal Dimension (height and roughness) of the fractal mountains. The value is used for subsequently generated fractal landscapes. Typing in a new value does not affect the current landscape unless you regenerate it. The default value is 100. Larger values will generate taller, rougher landscapes. Smaller values will generate flatter, smoother landscapes.

Frctlz

You can fractalize the current landscape to add fractal detail to them. If the Fractal Dimension is set to low values the effect of this will be to smooth the landscape. If the Fractal Dimension setting is high the landscape will become rougher. The fractal divisor buttons (1, 2, 4, and 8 immediately below the Fractlz button) control the scale at which the fractalize occurs. At lower values fractal noise is added only at very small

scales—the landscape will look basically the same shape, just rougher. At higher values the landscape will start looking rougher at larger scales and may no longer resemble the original landscape.

Stretch

The stretch function changes landscapes by vertically stretching existing features. Peaks will grow taller, valleys and pits will grow deeper. The scale at which this happens is controlled by the Fractal Divisor buttons (1, 2, 4, and 8, immediately above the stretch button). At lower values only the smallest features are stretched. At higher values only the larger features are stretched. You can stretch landscapes over and over again to create a caricature of the original landscape.

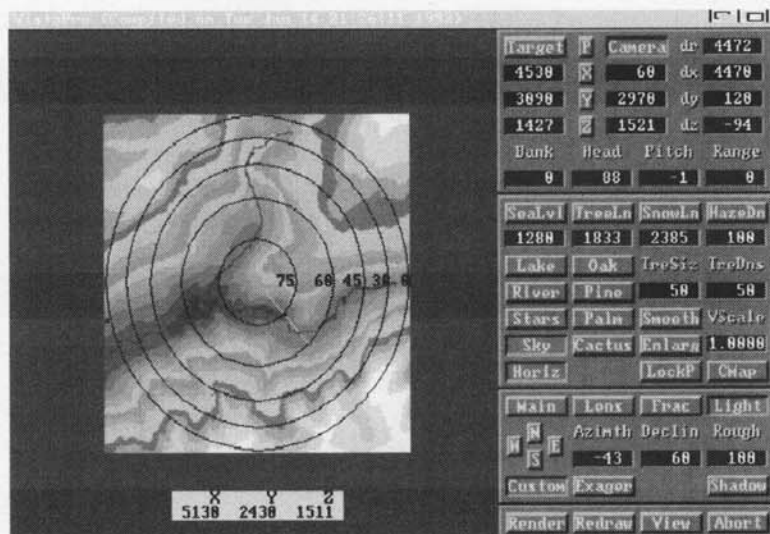
Fractal Landscape Number

This string gadget (located below the Random button) is for entering the number of the fractal landscape you want to generate. It also displays the random number generated after you press the Random button. Vistapro then uses this number to generate a fractal landscape. To enter your own value, position the mouse pointer over the gadget and press the left mouse button. The pointer will disappear. Type in your number from the keyboard and press RETURN. Vistapro will then generate that landscape. Note that the Fractal Dimension and Fractal Divisor values are used while generating the landscape.

Fractal Divisor

The Fractal Divisor buttons are the four buttons located between the Fractalize and Stretch buttons. They are labeled 1, 2, 4, and 8. The values they represent are used by the fractal generation routines. When Vistapro generates a fractal landscape (after you press Random or enter a value into the fractal landscape number gadget), it uses the current divisor setting. The smaller the fractal divisor, the larger the features of the landscape. At a setting of 1 very large mountains are generated. At 8, many small mountains are built. For the Fractalize and Stretch functions the divisor value represents the frequency at which the existing landscape data is sampled in order to generate the new landscape. See the sections for Fractalize and Stretch for more details.

LIGHT LOWER CONTROL PANEL



LIGHT LOWER CONTROL PANEL

Light Source Direction is the direction from which the sun is shining, and you use it in combination with the exposure, contrast and shadow settings to determine the location and depth of shadows when generating an image. This function moves the sun.

Whenever this panel is selected several concentric circles will be drawn in black over the landscape. These circles are reference points so that you can visually estimate the declination of the sun. The circles are labeled with the declinations that they represent, 75, 60, 45, 30 and 0 degrees above the horizon. A line (the Sun Vector) will be drawn from the center of the "bull's eye" out toward the edge of the landscape. The direction of the line indicates the Azimuth (direction around the horizon) from which the sun is shining. The length of the line indicates the declination of the light source. You should think of the Sun Vector as a stick stuck in the center of the landscape which is pointing at the sun. Since the topographic map is being viewed from directly overhead, the longer the stick appears, the closer the sun is to the horizon. If the stick appears very short it is pointing nearly straight up.

NSEW

Use the North, South, East, and West buttons (labeled N, S, E, and W) to quickly set one of four “standard” lighting positions. These buttons are positioned so that you can easily see from which direction the sun will be shining. When using one of these positions the sun will be at 45 degrees above the horizon. Using these pre-programmed directions will speed up the shading phase of rendering when shadows are enabled. After clicking on one of these buttons you will see the Sun Vector (the line radiating from the center of the “bull’s eye”) change to indicate the new direction.

Custom

The Custom button allows you to have complete control over the direction and angle of the light source. Selecting this button causes the sun vector to follow the mouse pointer as it moves around the screen. This represents the position of the sun in the sky. Think of the line as a stick pointing at the sun from the center of the landscape. Since you are looking down onto the landscape from above, the longer the stick is, the closer the sun is to the horizon, and the shorter the stick is, the closer the sun is to being directly overhead. The stick points in the direction of the sun. When you have located the desired direction and angle, a single click with the left mouse button locks this in place. Using a custom light source may increase the amount of time required to complete the shading phase of the rendering process when shadows are enabled.

Exager

The Exager (Exaggeration) button enables exaggerated shading. Imagine a ball in front of you, with a light shining on it from above. The top of the ball faces the light, and appears very bright. Points farther down the sides of the ball reflect less light and appear darker. Halfway down the side, the light no longer shines on the surface, and it is in shadow. Exaggerated shading increases the rate at which the shades darken around the sides of the ball. This technique can add detail to the image by exaggerating small irregularities on the landscape. You will probably want to disable this function when setting the sun at low declinations, since the exaggeration makes all the flat areas appear very dark.

Azimuth

You can use the Azimuth button to set the direction (in degrees from South). Zero degrees is due south, 90 degrees, due west, 180 degrees, due north and 270 degrees is due east. Note that this differs from the heading, which is measured from the due north, as is common in navigation.

Declin

You can use the Declin gadget to set the declination, the angle from the horizon, from which the sun shines. Zero degrees of declination puts the sun right on the horizon, while 90 degrees puts the sun directly overhead. This is similar to the way Pitch is measured for the camera.

In astronomy, this value is usually called Altitude (measured in degrees from the horizon), not Declination. It was decided that the term Altitude might be confusing since it is used in describing the altitude of the Camera (measured in meters). Be aware that the usage of Declination here is not technically correct.

Rough

The Rough button sets the apparent roughness of the landscape when rendered. Vistapro accomplishes this by adding a scaled random number to the shade of each polygon, so that some of the polygons will be darker than normal and some will be lighter. By doing this, large flat areas will appear to have a little more detail than they otherwise might. To set this value click the mouse pointer on the "Rough" string gadget. Change the number from the keyboard and press RETURN. Useful values range from 0 to 300, with higher values giving rougher appearing landscapes. Very large roughness values result in unnatural shading. This is used in conjunction with the "Texture" function.

Shadow

Vistapro has the ability to render landscapes with shadows. True shadows are very difficult and time consuming to render so Vistapro uses a quick less precise method. Only the landscape itself casts shadows; trees do not cast shadows. Shadows will not be cast outside the area of the topographic data. Shadows are enabled when the Shadow button is depressed. The Shading phase will require more time when Shadows are enabled.

BOTTOM CONTROL PANEL

Render

This starts the generation of a new picture using the current settings in the control panels. Vistapro performs several functions while rendering. It displays its progress at the bottom of the screen in the status window. For most functions, there is a continuously updated status count, so that you can monitor Vistapro's progress. (See Vista Status Window for more information.) You can abort the rendering process by pressing the abort button.

Redraw

The Redraw button redraws the image onto the View Screen in the current resolution/ mode set by the Display Menu. This only works for the image last rendered, or 24 bit image you loaded with the Load, IFF 24 menu item. For example, if you just generated a picture in lo-res mode and decide that you would like to see it in hi-res mode, you can simply select the Hi-Res menu item, and press the Redraw button. It is not necessary to re-render the picture.

Vistapro uses two different algorithms for drawing in HAM mode. If the polygon size is set to either 4 or 8, it employs a crude but fast algorithm. When using HAM mode, more HAM artifacting is noticeable at these poly sizes. HAM artifacting is the colored spikes that can appear in a HAM image at sharp contrast transition boundaries. If the polygon size is set to 1 or 2, Vistapro uses a more precise method, resulting in less HAM artifacting.

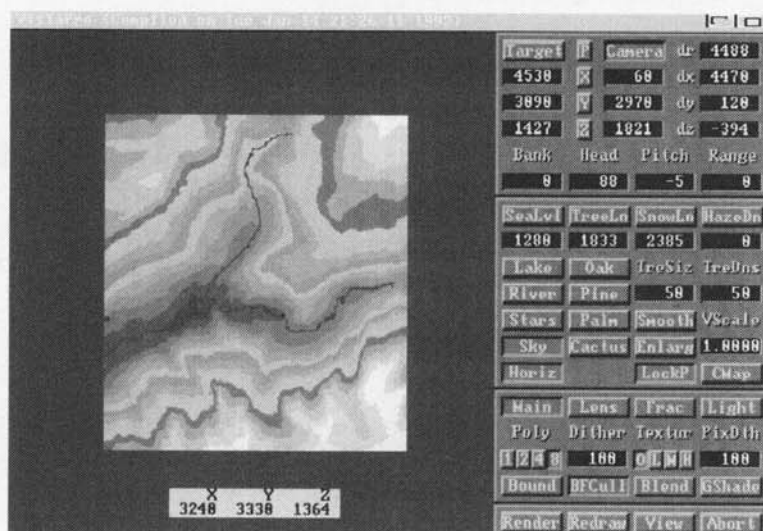
View

When the rendering is complete, Vistapro automatically displays the image. If you have returned to the Control Panel, you can redisplay the image with the View button.

Abort

You can use the Abort button to stop the Rendering function, and River and Lake generation. With Lake generation, Vistapro removes the lake from the landscape, which may result in the erasing of any River data that it overlaid when generating the lake. When generating a river, Abort simply stops flowing the river. It does not remove the part already generated. The Abort button may not appear to be pressed when you press the mouse button, but it will still be active and will abort the current function.

THE VISTA STATUS WINDOW



VISTA STATUS WINDOW

The Status Window is the area just below the topographic map. Vistapro uses this area to give you messages about what it is doing while rendering. It also indicates the mouse position while in the Camera/Target placement modes

The following sections describe the messages that will be displayed in the Status Window.

X, Y, Z:

The X, Y, and Z values you see in the status window while moving the mouse pointer over the landscape are the X, Y, and Z coordinates of the landscape at that point. If you think of North being the top of the screen, the X coordinate represents the distance in meters East of the left edge of the topographic map. The Y coordinate represents the distance in meters from the bottom of the topographic map. The Z coordinate represents the elevation above sea level in meters of that point of the topographic map.

Generate:

Vistapro is generating a new fractal landscape.

Color

Vistapro is calculating the colors of the polygons comprising the landscape based upon their altitude and the topography of the terrain. Vistapro does coloring whenever you modify the snow line, tree line, or sea level, or if you render an image at a smaller polygon size than before.

Cliffs

Vistapro is placing cliff colors on the steep areas. Recalculating cliffs takes place whenever you change snow or tree lines, or if you render an image at a smaller polygon size than before.

Shade

The Shade function is calculating the amount of light reflected by each polygon. Vistapro recalculates shade when you draw a river or lake, select a smaller polygon size, smooth the landscape, or vary the light position.

Tree

During the Tree function, Vistapro calculates the location of Trees for inclusion during the Render function.

Sky

During the Sky function, Vistapro is drawing the sky, including the sky haze effects. This may take several seconds, and Vistapro does not display a counter.

Horizon

During the Horizon function, Vistapro draws the ground, ocean, or space that surrounds the DEM portion of the view. Because of the haze effect, the time required is several seconds.



EXAMPLE OF LANDSCAPE AFTER RENDERING

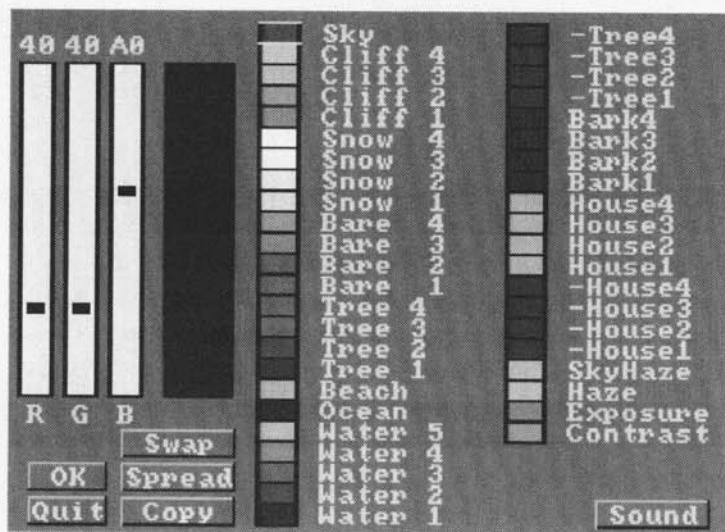
Render:

Vistapro draws DEM polygons. The image cannot be seen as it is being drawn, because it is drawn to a virtual screen. We designed Vistapro in this manner to increase its rendering speed and the flexibility of its output. The virtual screen format makes drawing polygons very fast, especially since the final display may be in any of the Amiga's display modes. In the final step, Vistapro converts the image from the virtual screen to display on the real screen. The image is transferred to the Amiga's screen in several bands from the top to the bottom of the screen. Vistapro draws the virtual image with 24 bits of color information (16 million colors). Vistapro does its best to convert the 16 million possible colors in the virtual screen to the limited number of colors of the real screen.

In HAM mode Vistapro uses two different algorithms for drawing the real screen. If the polygon size is set to either 4 or 8, Vistapro uses a crude but fast algorithm. If the polygon size is set to 1 or 2, it uses a more precise, but slower method.

Vistapro calculates steps like coloring and shading only to the level of detail required for the current polygon size. Vistapro saves the results of these calculations in memory, so that it will not have to recalculate them. The program doesn't recalculate these tables when switched from a small polygon size to a large polygon size. It uses the data from the small polygons to draw the larger polygons. Therefore, Vistapro will not have to recalculate tables, if you re-select smaller size polygons. Once Vistapro has made the calculations for small polygons, it will not color or shade renderings with large polygons exactly right. However, this is preferable to recalculating, because it saves time. Large polygon sizes are usually used for previewing, so it doesn't matter if the image generated is not precise. But you can force Vistapro to recalculate the color tables for large polygons by changing the tree line or snow line. Even entering the same value again will force recalculation. To force reshading, change or re-set any of the Light functions.

COLOR CONTROL PANEL



COLOR CONTROL PANEL

The Color Control Panel controls palette selection and a variety of other functions. You access this panel by pressing the CMap button. The R(ed) G(reen) B(lue) sliders on the left hand part of the screen allow you to select and mix colors. Vistapro devotes the center part of the screen to the aspects of landscape coloration under your control. The OK button loads the selections made by you and returns you to the main Vistapro Control Panel. You can find how to use the various features on the Color Control Panel described below.

Colors

You can use the Color palette to change the color ranges for Sky, Cliffs, Snow, Bare Earth, Vegetation (Trees or Brush), and Water. These are the colors of the polygons that make up the landscape. Each of the colors will be shaded and faded by Vistapro as it renders.

For example, an apple may be a uniform shade of red, but the side that faces the light is brighter than the side that faces away from the light. The apple will fade towards haze color, as you move it farther into the haze.

Even though there are only a few different object colors in Vistapro, each of the colors may produce hundreds of shades.

Vistapro maps Snow, Bare, and Tree colors to the landscape fundamentally by elevation. Vistapro gives the lowest elevations Tree colors, middle elevations Bare colors, and high elevations Snow colors. The same is true for each of the four colors within each segment. It assigns the lowest elevations Tree color 1, slightly higher elevations Tree color 2, and so forth. The designation of colors as Tree, Bare and Snow is arbitrary.

The user is able, for instance, to make them all different shades of red for a Martian landscape, or any colors desired for an especially bizarre picture. The boundary between the different zones is fuzzy. For instance, setting the tree line at 1000 meters doesn't mean that everything below 1000 meters will be tree and everything above it will be set to Bare or Snow. The local shape of the landscape and some random dithering affect all the colors.

Vistapro uses Cliff colors for portions of the landscape where the terrain is very steep. Cliff color 1 is for slightly steep regions, Cliff color 2 for steeper portions, and so on through the range of cliff colorations. It uses Beach color for the boundary (if any) between the sea and the land. Vistapro uses Water colors for rivers and lakes. It assigns to flat bodies of water Water colors 1 and 2. River colors 3 and 4 indicate rapids. Waterfalls are Water color 5. Ocean color is the color of the region surrounding the Elevation Model Data. This color need not be the color of the sea or of water at all. Depending upon the effect desired, it might be green to match the lowest landscape colors.

Sky color is simply the color of the sky. You can obtain an interesting effect by making Sky and Ocean colors black and by setting the Haze value to 0. This creates landscapes that appear to be floating in space. Sky Haze is the color that the sky fades to in the distance. Haze is the color that the land/ water fade to in the distance. Keep in mind that the thickness of the haze (or magnitude of the haze effect) is set by the Haze setting on the main Control Panel. You can produce another interesting effect by setting the Haze and Sky Haze to black and the Haze value to a high number like 300. This makes the landscape look like a night scene lit up by a light behind the camera.

Set the exposure and contrast settings with the Exposure and Contrast controls. Higher Exposure settings lead to brighter pictures. Higher Contrast settings lead to more contrast in the images. You can use only the Red slider to control Exposure and Contrast settings.

OK

You can return to the main Vista Control Panels with the OK button, using the changes you have made.

Spread

The Spread function provides for a smooth series of color changes from one color to another. In order to use the Spread function, click on the upper color, click on Spread and then click on the lower color. As an example, suppose you want the lowest elevation of brush to be a dark green and the highest to be a light green. You would set the Brush 1 color to a light green, and the Brush 4 color to a dark green, and use Spread to fill in the colors for Brush 2 and Brush 3.

Quit

You may return to the main Vista Control Panel by using the Quit button. This resets the colors back to what they were before you entered the Color Control Panel.

Copy

The Copy button copies a color from one palette segment to another. Click on the color you want to copy, then click on Copy, and finally click on the color you want to change. You will see the second color change to be the same as the first.

Swap

The Swap button swaps two colors around. Click on one of the colors you want to swap. Then click on the Swap button. Finally, click on the color with which you want to swap. You will see that the colors have swapped places.

Sound

The fractal music generated by Vistapro is a musical rendering of the values of the polygons Vistapro is using to generate the final image before display. It is the sound of fractal mathematics in action.

COLORS

Sky

This is the primary color that Vistapro will use in generating the sky. Haze and Sky Haze will alter this when appropriate.

Cliff 1-4

These are the primary colors that Vistapro will use in generating Cliff regions in a landscape. Cliff 4 represents the steepest cliffs, and Cliff 1 the least steep. Vistapro will use shades of these colors when these areas are in shadow.

Snow 1-4

These are the primary colors that Vistapro will use in generating regions of the landscape that are above the snow line. Snow 4 is the highest elevation above the snow line and Snow 1 is the lowest. Vistapro will use shades of these colors when these areas are in shadow.

Bare 1-4

These are the primary colors that Vistapro will use in generating regions of the landscape that lie between the tree line and the snow line, and that are not as steep as cliffs. Bare 4 is the highest such elevation and Bare 1 the lowest. Vistapro will use shades of these colors when these areas are in shadow.

Tree 1-4

These are the primary colors that Vistapro will use when drawing trees. As with Snow, Tree 1-4 is used for trees at the highest elevation and Tree 1 the lowest. Vistapro will use shades of these colors when these areas are in shadow.

Beach

This is the primary color that Vistapro will use to separate the bottom of the brush area from any sea that has been generated. Vistapro will use shades of these colors when these areas are in shadow.

Horizon

This is the primary color of the area that is at sea level surrounding the topographic data.

Water 1-5

These are the primary colors that Vistapro will use for rivers and lakes. Water 5 represents the fastest water, and Water 1 the most placid. Vistapro will use shades of these colors when these areas are in shadow.

SkyHaze

Vistapro will add this color to the sky near the surface, depending upon the amount of haze selected. There will be a smooth transition from sky color to sky haze color as the sky approaches the horizon in the distance.

Haze

Vistapro will add this color to land areas based upon the distance from the camera and the amount of haze selected.

—Tree 1-4

These colors are used to draw the ground underneath trees whether or not trees are enabled. We find that brown or dark green shades look most natural. As with Trees, Tree1 is used at the lower elevations and Tree4 at the higher elevations.

Bark 1-4

These colors are used to draw the tree trunks and larger branches. These are usually set to dark brown but you might also select whites (Birch trees) or some other colors.

House 1-4

Vistapro can draw rectangular buildings (sorry, no doors and windows!) where House 1-4 colors are placed on the landscape. The house colors are selected using these colors. Vistapro will use shades of these colors when these areas are in shadow.

Note: houses can only be placed on the landscape using the Col→IFF and IFF→Col functions.

—House 1-4

Vistapro uses these colors to draw the ground underneath Houses. You might use black to simulate asphalt, white to simulate concrete, or green to simulate grass.

Exposure

This is similar to the F stop on a camera lens. The longer the exposure, the lighter the final image.

Contrast

This regulates the contrast of the final image. High contrast will make the darker areas very dark, and the lighter areas very light. Low contrast will lessen the difference between the dark and light areas.

VIEWER

Viewer is a proprietary animation player written by Hypercube Engineering and distributed by Virtual Reality Laboratories, Inc. It allows you to play VANIM files at up to 13 frames per second from your hard disk. It has a very simple straightforward interface, and is quite easy to use.

To use Viewer, simply type: `Viewer <myanim>`

where `<myanim>` is the name of the animation you created with Vistapro using the VANIM format.

You can control the speed with which Viewer plays your animation by pressing the number keys on your main keyboard. (Not the numeric keypad!!!) The number 1 is slowest, and the number 0 is fastest. The numbers between 1 and 0 represent increments of speed change.

You can use the keypad to control the direction that your anim plays, as well as single frame, skip 10 frames, go to beginning and go to end.

You may exit from the Viewer program using the ESC key.

When viewing a large animation, it helps to have a lot of disk buffers. Use the AmigaDOS 'AddBuffers' command to add disk buffers. We recommend about 2 buffers for each frame of the animation. For example, for a 500 frame VANIM file (24 megabytes in HAM, no interlace or overscan), on drive DH0:, you should have about 1000 disk buffers. This can be accomplished by typing "AddBuffers DH0: 1000", at the AmigaDOS Shell or CLI prompt. You only need to do this once, each time you re-boot your Amiga. A thousand buffers will consume about a half of a megabyte of memory.

APPENDIX A

What are Fractals and Fractal Geometry?

by Daniel Wolf Ph.D.

(Author and Publisher of Fractal Pro, President of MegageM.)

The concept of fractal geometry is the basis of Vistapro's capacity to generate imaginary scenes. Many computer graphics enthusiasts, especially in the Amiga community, have become interested in fractal graphics through programs such as Vistapro, FractalPro, and public domain Mandelbrot and scenery programs. The popularity of fractal graphics using personal computers traces back to the appearance of stunning images of the Mandelbrot Set (a type of fractal object) on the cover of Scientific American in August of 1985. That widespread exposure of these strangely beautiful abstract objects led many amateur and professional programmers to the original source book on fractals: The Fractal Geometry of Nature (by Benoit Mandelbrot). While fractals and fractal geometry have become hot buzzwords in the computer graphics field, it is not exactly obvious what they are. The following description is simplified, and interested students and readers should read Mandelbrot's book on the subject.

We owe the word "fractal" to Mr. Mandelbrot, a mathematician and Fellow at IBM's Watson research organization in New York. Fractal refers to objects with fractional dimensions, that is, objects which don't really fit into the ordinary world of things like lines (1-dimensional), surfaces (2-dimensional) and solids (3-dimensional). Fractals are objects which fit in between these normal dimensional objects. Mandelbrot took an interest in a long neglected area of mathematics which originated at the turn of this century. Some devotees of geometry at that time began to study lines which didn't behave like ordinary lines.

If you read Mandelbrot's book you'll become familiar with some of the mathematical history of things like Peano curves, Hilbert curves, and Koch snowflakes. What makes these objects so strange, and what led Mandelbrot to look deeper, are two properties: these lines tend to fill up a 2-dimensional surface (they act as if they are something in between

lines and planes), and their appearance seems to be identical no matter how much they are magnified. Magnified small portions of these fractal lines tend to look like the whole unmagnified line. Odd indeed! Mathematicians at the turn of the century tended to call such objects pathological and didn't have a good way of integrating them into the rest of mathematics, especially geometry. Geometry was mostly dominated by the study of well-behaved, smooth, simple forms like lines, planes, and solids. Mandelbrot made a systematic study of these weird fractional dimension geometric forms and helped bring them into the mathematical fold. Mandelbrot also showed how these objects are models of many things found in the natural world, like surface textures of mountains, coastlines of islands, and branching designs of plants, trees, blood vessels, and lung tubes (bronchi).

If you want to get a mental picture of how Vistapro exploits fractal geometry to generate natural looking land surface textures, take the following little mental journey into the process of crumpling a sheet of paper:

1. Imagine a flat triangular sheet of paper.
2. Divide the sheet into a small number of sub-triangles.
3. Randomly select some of the intersection points and raise or lower them (by a large amount) above the original plane of the flat sheet.
4. Now divide the sub-triangles into smaller sub-triangles.
5. Randomly raise and lower some of the newly created corner points like you did in step 3, but by a smaller amount than in step 3.
6. Keep repeating steps 4 and 5 making smaller and smaller sub-triangles and raising and lowering corner points randomly by smaller and smaller amounts at each step.
7. Stop when you've reached a point where each smaller division into sub-triangles can't make any more difference in appearance on a limited resolution display like a computer monitor.
8. Now color all the little sub-triangles by a method which makes the highest corner points white (snow on the mountain tops), lower ones

brown and green (mountain sides with trees) and the lowest ones blue (a lake at the bottom of the mountain valley).

If we did Steps 4 and 5 using some regular (non-random) technique, in the end the highly crumpled surface would be a lot like the first fractals explored by Mandelbrot; they would look similar at any degree of magnification they were viewed. The introduction of randomness to the process makes them look similarly random at different degrees of magnification.

If you are interested in further exploring fractal geometry, here are some helpful books:

The Fractal Geometry of Nature (by B. Mandelbrot) *The Beauty of Fractals* (by H. Peitgen and P. Richter) *The Science of Fractal Images* (by H. Peitgen and D. Saupe)

APPENDIX B

The Landscapes

Most of the landscape DEM files were obtained from the USGS and are accurate to within 7.5 meters. Some of the files were assembled to fit into Vistapro and therefore may not be perfect where they are joined.

ElCap.dem:

ElCap is a section of Yosemite Valley in California out of which rises El Capitan, a very large (about 1000 meters) granite cliff formation at coordinate 2520,5760 (X, Y) in the DEM data. This landscape was created by joining together two USGS DEM files and then clipping out the section of interest. A small "scar" that runs North/South where the USGS data did not quite line up can be seen. The joining scar is most apparent in the valley with the sun shining from the east or west at approximately 3400,4980. This DEM file is as accurate as the original USGS data.

HalfDome.dem:

The HalfDome section of Yosemite Valley contains the famous granite formation know as Half Dome at location 5100,7260. The method used by the USGS to digitize the terrain led to some distortion at the top and edges of Half Dome. The jaggy bump at the top of Half Dome is a USGS artifact. This DEM file is as accurate as the original USGS data since it was simply clipped out of one DEM file.

CraterLake.dem:

Crater Lake is the caldera of an ancient volcano in Oregon. The walls of the caldera rise approximately 1250 meters from the bottom of the lake to the top of the caldera. The DEM data includes the underwater elevations. The lake fills the caldera to a level about half way up the walls. The mound near the west edge of the caldera is Wizard Island. It is separated from the edge by the lake. The circular mound near the top of

the caldera is completely submerged. The lake can be filled with water using the Lake function of Vistapro. Clicking the mouse button about halfway from Wizard Island to the edge of the caldera gives approximately the right water level. In order to include the entire lake in the file, everything was adjusted down by a factor of 0.6. Therefore, to convert elevations or distances into actual meters take the values given by Vistapro and divides them by 0.6.

MSHB.dem: and MSHA.dem:

Mt. St. Helens is the volcano in Washington that blew its top on May 18, 1980. The explosive eruption was preceded by amounts of intense earthquake activity. A 150 meter bulge started to grow in April at a rate of 5 meters per day. A magnitude 5.1 earthquake sets into motion the collapse of the bulge and the following explosion. Winds from the blast were calculated at 670 miles per hour. Almost everything within 8 miles of the blast was obliterated. Virtually all trees were flattened at distances up to 19 miles from the volcano. Significant amounts of volcanic ash fell as far as one thousand miles away. The new crater is about 3 kilometers wide and 700 meters deep. The "before" data was generated from stereo photographs taken in 1979. The "after" data comes from photographs taken late in 1980.

Mons.dem:

Olympus Mons is a huge volcano on the surface of Mars that is roughly twice as tall as Mt. Everest on earth! It is about 500 kilometers in diameter and rises approximately 18 kilometers above the surrounding landscape. The original DEM file which contains the entire volcano is over 4 megabytes! The DEM file included here contains only the interesting caldera portion of the volcano. The technique used by the USGS to generate this kind of extra-terrestrial data creates extensive artifacting resulting in raked lines in the landscape. One or two smoothing passes will remove these artifacts. The data on the vertical axis is exaggerated by 4 fold to make the landscape more dramatic. Elevations are measured from an arbitrary reference, because there is no sea level on Mars.

Julia.dem: and Mandelbrot.dem:

Julia and Mandelbrot landscapes are artificially generated by a mathematical algorithm. The user may have seen Julia sets and Mandelbrot sets displayed as colors on a 2-D screen. If the user has a Mandelbrot generating program that will handle Julia sets, or a Julia generating program, the locations are as follows: The Mandelbrot is 1.255525 real – 0.381060 imaginary, with a diameter of approximately 0.007; the location of the Julia set is 0.75 real – 0.11 imaginary, relative to the Mandelbrot set.

Arrowhead.dem:

This is the Lake Arrowhead region of the San Bernardino Mountains in Southern California. The low-lying region forms a lake that is in the shape of an arrowhead, hence the name. The lake was formed by the addition of a man-made dam, which is not part of the DEM data, so it is impossible to fill the lake without flooding the landscape below. This is clipped from a larger data set that is also available from VRLI called "Lake Arrowhead and Environs."

Vantage.dem:

This is a portion of the Columbia River in the state of Washington that forms the north portion of Wanapum Lake. It is located in Ginkgo State Park near Vantage, Washington.

SanLuisObispo.dem:

This is the area that we see when we look out our windows. VRLI is located toward the southeast portion of the topographic map. The mountains are not of spectacular height, but it forms quite a pleasing landscape.

SanGorgonio.dem:

This is south of the Big Bear Lake region of the San Bernardino Mountains in Southern California. It contains Mt. San Gorgonio, a 3500 meter peak in an area known as the San Gabriel wilderness. This is clipped from a

larger data set that is available from VRLI, called the "San Gorgonio Mountain and Environs."

BigSur.dem:

This is the Big Sur area along the coast of north central California, just south of the Monterey Peninsula. It contains the Pfeiffer Big Sur National Park. It is one of the more beautiful camping areas in California, and contains one of the southernmost groves of redwoods. It is clipped from a larger data set that is available from VRLI called "Big Sur and Environs."

MorroBay.dem:

This is the data set for Morro Bay, one of our local tourist attractions on the central coast of California. There is a large rock that juts up into the fog called Morro Rock. This is visible as a mound in the northwest corner of the topographic map.

MtBaldy.dem:

Contrary to popular belief there is no such mountain as Mt. Baldy in southern California. That is the name of the village on the slopes of Mt. San Antonio. This is located in the San Gabriel mountains south of Wrightwood. This has been clipped from a larger data set that is available from VRLI called "Mt. Baldy and Environs."

MtAdams.dem:

This contains Mt. Adams in the southern portion of Washington State. It is part of the Mt. Adams Wilderness, and is a good example of a volcano, reaching from a height of over 3700 meters at its peak. It was clipped from a larger data set that is available from VRLI called Mt. Adams and Environs.

WoodSh.dem:

This is the first of our undersea data, a volcanic region located at 21 degrees 13 minutes north and 166 degrees 24 minutes east, 500 miles north of Wake Island. This is actually several thousand meters below sea level, but has been scaled to appear above sea level for rendering purposes.

Grand Canyon.dem:

This landscape was selected as representative of the steep canyons found in the Grand Canyon. It is located in the south eastern portion of the National Park.

Sundial.dem:

This is a landscape produced by Joseph Laleman, one of the beta testers for Vistapro 2.0. It was made using TerraForm, and is a really incredible piece of work.

APPENDIX C

Glossary of Terms

AI

Artificial Intelligence. The ability of a program to incorporate expert judgement enabling it to imitate intelligent decision making.

Aliasing Artifacts

Objects which appear in a landscape which are not derived from mapping data. They may reside in the data or they may be formed as a result of the program.

Caldera

The crater at the top of a volcano.

DEM

Digital Elevation Model is a model of a landscape reduced to three dimensional digital coordinates.

Digi Paint

A paint program published by NewTek and used to display or modify IFF picture files created by Vistapro.

Digital Elevation Model

Digital Elevation Model is a model of a landscape reduced to three dimensional digital coordinates. Abbreviated: DEM.

Dithering

A program function which blurs the boundaries between polygons in order to more closely simulate realism in landscape creation.

Fat Polys

Foreground polygons which are relatively larger than the polygons in distant scenes. Fat Polys are a function of perspective and the accuracy of the data being rendered.

Fractal

Fractional dimension. Most math deals with whole numbered dimensions. One dimension is a point. Two dimensions are a line. Three dimensions are a solid. Four dimensions are a space-time solid, and so on. Fractals deal with non-whole numbered dimensions, and fractal geometry is capable of producing pictures which are remarkably similar to natural phenomena, particularly geological shapes.

Fractal Pro

A professional level fractal program published by MegageM.

HAM

Stands for Hold and Modify. A technique used to display more colors than the 4096 the Amiga normally handles.

Haze

The atmospheric occlusion that increases with the distance between the eye and the target.

IFF

The standard graphic file format used on the Amiga.

Jaggies

Partial polygons which produce jagged lines often at the ridge line of a landscape and sometimes in the foreground. Jaggies distort the realism of a scene.

Olympus Mons

A volcano on Mars. Olympus Mons is an extremely vast feature. The base of the volcano covers an area the size of Nebraska. Olympus Mons also has a feature which is unique within the solar system. The base of the volcano is well within the thin atmosphere of Mars. The peak of the volcano is virtually above the Martian atmosphere allowing launch to orbit by magnetic acceleration. A tramway could be constructed from the base of Mons Olympus to the top of Mons Olympus. Liquefied carbon dioxide, water, hydrogen, and oxygen (condensed from the atmosphere) could then be transported for magnetic rail launch into orbit at the top. A return from space could be accomplished with aero-braking. Therefore, Mons Olympus could become the basis for a Martian space transportation system which did not require rockets.

Polygons

The basic geometric units with which Vistapro renders landscapes. A polygon is a two dimensional shape having at least three linear sides.

Ray Tracing

A method of image generation where a hypothetical ray of light is projected, reflecting off the target and ultimately colliding with the camera.

Topography

Science of drawing maps representing the surface features of a region.

Topology

The study of the surface features of a region.

VISTAPRO TUTORIALS

To use the following tutorials, Vistapro must be installed on your hard drive or on floppies. If this has not been done then refer to the Installation and Quickstart insert.

These tutorials have been written with the idea that you will start at the beginning and work your way down to the end. Descriptions will be more extensive earlier on and become less extensive. The idea being that the reader, through the use of Vistapro, is increasingly familiar with the program. If you skip sections and find something unclear, you will most likely find clarification in an earlier section.

TUTORIAL 1 - THE BASICS

Running Vistapro

To run Vistapro you will need to be at the Workbench. Open your Vistapro drawer and run Vistapro by double-clicking on the Vistapro icon. You will be ready to start when you see a screen with the gray Control Panels on the right hand side and the empty green topographical map on the left.

A Quick Introduction

When Vistapro is first loaded, it starts out with a flat landscape. Although it's not very interesting, let's take a quick look at this flat landscape. Locate the Render button at the lower left hand corner of the Lower Control Panel. Move the mouse pointer to the Render button. Press and release the left mouse button to activate the Render button.

You should now see a sequence of status messages on the screen in the blue area immediately above the topographic map. Exactly what these messages mean is documented elsewhere in this manual — for now just note that Vistapro needs to make some calculations before drawing. After a few seconds you should see the screen switch to the View screen. At first you will see a black screen, and then Vistapro will begin to draw the rendered image in "venetian blind" style. If you look closely, off in the distance, you will see a small pyramid. At the current settings (assuming you haven't changed anything) the pyramid will be barely discernible.

Well, it's not much to look at, but you just rendered your first Vistapro image. To switch back to the Control Panels and topographical map, just click on the left mouse button. Let's go on to something more interesting.

Loading a DEM Landscape

To load a landscape, position the mouse pointer over the Project menu at the top of the screen. Press and hold the right mouse button. The Project menu will drop down to reveal several options. Move the mouse

pointer (while still holding the right button) to the first option, Load DEM, and release the button.

Now you should see the Vistapro Load DEM File Requestor. The Vistapro File Requestor is used anytime a file is to be loaded or saved.

At the top of the Load DEM File Requestor is a button labeled "Drawer" and a black space to its right. At the bottom of the requestor are two buttons, the one on the left labeled "OK" and the one on the right labeled "Cancel." Just above these buttons is another row of buttons labeled "SYS:," "DH0:," "DH1:," "DF0:," and "RAM:." These are quick access buttons for commonly used devices. Above this row is another black space for the filename.

The OK button is this File Requestors confirm button. Clicking on it means to go ahead and load the file.

The Cancel button is used to exit the File Requestor without taking an action. Clicking on this with the mouse pointer means no file will be loaded (or saved depending on the File Requestor).

The terms "text gadget" and "numerical gadget" will be used throughout this tutorial. A text gadget is a field that accepts text entered using the keyboard and a numerical gadget accepts numbers. To start entering information in a text or numerical gadget, click on it with the mouse pointer. To end and have the information accepted, press the Enter key. To abort, click on the Cancel button. You will not need to enter anything into these particular text gadgets for this tutorial.

At the center of the File Requestor is the Filename Window. It will currently be displaying a list of directories (the names with "(DIR)" in the right hand column) and Vistapro, and Vistapro.info files. Look through the list until you find the Landscapes directory. If there are more files than fit in the window use the drag gadget to the right of the Filename Window to scroll up and down the list.

After you have located the Landscapes directory, position the mouse pointer over it and click the left mouse button. You will now be presented with a list of the Landscapes directory. You should see a list of files ending with ".DEM." You can scroll up and down the list of files by using the button to the right as described earlier.

Find the file TUTORIAL.DEM and click on it. Notice that in the Filename text gadget, is the name TUTORIAL.DEM. We could have typed the file name directly into this filename text gadget, but for small lists it's much faster to click on the name with the mouse pointer. Click on the confirm button, which is the button labeled OK at the bottom left of the File Requestor.

The screen will switch back to the topographical map and Control Panel and Vistapro will begin loading the landscape. It could take several seconds to complete.

Once Vistapro is done loading the landscape, you will see a topographical view of the landscape in the box near the left side of the screen.

The topographic map is colored by elevation. Dark greens represent the lowest altitudes, browns represent the middle altitudes, and gray-whites are the highest. Move your mouse pointer over the landscape. Notice that the X, Y, and Z figures in the Status Window (located below the topographical map) change. The X and Y values represent the location of the pointer on the map, and the Z value represents the elevation of the terrain under the pointer.

Setting Camera and Target Locations

When you first rendered the flat landscape at the beginning of this tutorial, you used the default camera and target position. Let's take a look at moving your viewpoint.

If you look at the very top of the topographical map, you will see a little black box. This is your camera position on the landscape. At the very bottom of the map you will see a little black plus (+). This is your target position (the point at which your camera will be aimed).

Look at the X, Y, and Z gadgets located below the Camera button on the Upper Control Panel. The values in these gadgets represent the location of your camera on the landscape.

To move the Camera position, click on the Camera button. Move the mouse pointer over to the topographic map to where you would like to be standing if you were taking a picture. When you have found this

point, click once with the left mouse button to set the camera location. You will notice that the little black box is now at the location you selected.

If you would like to be above the surface, as if on a tall ladder, click on the numerical gadget below the Camera button and to the right of the Z button. Enter the altitude (height of your camera on the ladder) and press the Enter key. This raises you up off of the surface, but leaves you in the same location.

Now you need to tell the camera which way to be pointing when taking the picture. This is done by clicking on the Target button with the left mouse button, and then positioning the mouse to the point at which you want to aim the camera, and clicking the left mouse button again. You can change the vertical position of the target in the same way you did with the camera.

Let's pick a point to look at. If you have been following this tutorial from the beginning, the landscape TUTORIAL.DEM should already be loaded and displayed in the topographical map.

This landscape has five distinctive objects, two at the top, one in the middle, and two at the bottom. Most landscapes will not look like this, but this landscape was made especially for this tutorial.

Click on the Camera button. Now click on the blue square in the middle of the landscape. Your camera X,Y, and Z position are set.

Look at the Z value under the Camera button. You'll notice that it is "30." When setting a camera or target location, Vistapro will set the Z value to 30 meters above the landscape. In this case the landscape under the camera was 0 meters (above sea level). Let's lift the camera up a bit higher. Click on the Z numerical gadget under the Camera button and press the number 5 followed by pressing the Enter key. The Z position of the camera should now be "530."

To set the target, click on the Target button and then click on the oddly shaped object at the top left hand corner.

Viewing your Camera Position

Right below the word Poly on the Main Lower Control Panel you will find four buttons. They are 1,2,4,8. These buttons are used by Vistapro to determine the size of the polygons used to draw the landscape. Only one can be selected at a time. If you just want to get an idea of your camera position, click on the 8 button. This will cause Vistapro to use large polygons and fewer of them. As you can see, the larger the Poly setting, the less detail the image will have. The advantage of less detail is more speed.

Another way to decrease rendering time is to click on the LockP button located on the Middle Control Panel. This will prevent Vistapro from calculating a new color palette (which can be time consuming). Before rendering your final image, you will want to unlock the color palette (click on LockP again) so that Vistapro will calculate the best colors to use for the image.

Let's take a quick look at the landscape, and click on the 8 button. Click on the LockP button, just to speed things up. Now click on the Render button, and wait while Vistapro renders the landscape.

As you can see, the landscape looks very blocky, but it gives you an idea of your camera position. Return to the topographical map and Control Panel screen by clicking the left mouse button. At this point, you can change your camera and target positions as outlined above, and re-render until you have the camera position that you like. Once you like the camera position, select a smaller Poly setting and then click on the Render button.

Try rendering using each of the Poly settings. You will notice that a Poly setting of 1 can take a bit of time to render. That's why it's a good idea to use the larger and faster setting to fine tune your camera position.

If you want to abort a rendering in progress, simply click on the Abort button.

Adjusting the Camera Lens

Your imaginary camera also has an imaginary lens. To zoom in, or out, click on the Lens button on the Middle Control Panel. Once you click on the Lens button, you will notice that the Lower Control Panel switches to become the Lens Lower Control Panel. There are two buttons located on this Panel: Wide and Zoom.

The Wide button is the default selection and has a focal length similar to a wide angle lens on a real camera.

Click on the Zoom button. Now click on the Main button to get the Lower Control Panel back. Click on the Render button. Notice that the object (mound) is now larger.

Click the left mouse button to return to the Control Panels. Click on the Lens button again. At the bottom of the Lens Control Panel, you'll notice a numeric gadget. This contains the zoom value. This value can be changed for a custom zoom value. The larger the number, the greater the magnification.

Making a Smoother Image

When rendering a landscape, even at Polygon size 1, you will often see small triangles in the close up portions of the picture. This is because the USGS data used to make the Vistapro DEM files is made up of elevation points that are about 30 meters apart. When that distance is more than 1 pixel wide, then that point in the landscape will render as a triangular block. There are several methods of hiding these blocks when rendering.

Blend

Blending smooths the changes in color from polygon to polygon, causing the small polygons to be less apparent, especially in the distance. To use blending, click on the Blend button, on the Middle Control Panel, before you render a picture. The button will remain pushed in until you again click on it to disable it.

Gouraud Shading

Gouraud shading smooths the boundary between polygons, making it a lot less apparent that they are even there. It also eliminates sharp transitions from one color to another, giving the image more of the quality of an artists rendition. Gouraud Shading may be enabled by pressing the GShade button in the Main Lower Control Panel before rendering a picture. The button will remain pushed until you again click on it to disable it.

Dither

There are two methods of dithering available with Vistapro. The first, using the Dither button causes a blending of the elevation colors, reducing the sharpness of the snow and tree lines. This can be changed by clicking on the numerical gadget below the word Dither in the Main Lower Control Panel, and entering a new value. Larger values result in more dithering, smaller in less.

The second method is called pixel dithering, mixing slightly different colored pixels to simulate more colors. This can be set by clicking on the numerical gadget below the PixDth button on the Main Lower Control Panel and entering a new value. Larger values result in more dithering, smaller in less. You can add so much dithering so as to make the image entirely unrecognizable.

Experiment

Spend some time experimenting with the features we have discussed. Try changing your camera and target location and rendering at different Poly levels with the different blending features. After you have a good feel for the operation of the program, go on to the next tutorial.

TUTORIAL 2

MAKING A PRETTIER PICTURE

Before starting this tutorial, you should have Vistapro running and have the DEM file TUTORIAL.DEM loaded. If you are not at this state, refer to Tutorial #1.

Loading an IFF Image

Before we further explore Vistapro features, let's take a look at a saved IFF image of the TUTORIAL.DEM landscape.

Select the Load IFF option from the LOAD menu (top of the screen).

You should now see the Vistapro File Requester. If you are unfamiliar with the File Requester, refer to Tutorial #1: Loading a DEM Landscape.

Position the mouse pointer over the Pics directory and click the left button. Search the list of files until you find the file: TUTORIAL.IFF. Click the left mouse button on this file. Vistapro will now load and display the IFF image.

The image that you are looking at was created using the TUTORIAL.DEM landscape and several of Vistapro's options. It probably looks a lot different than what you were able to achieve using the features in Tutorial #1. Through the use of Vistapro's features, this relatively dull landscape has been prettied up a bit.

Let's examine some of the options used to give this image its look.

To get back to the topographical map and Control Panel, and click the left mouse button.

Adding Texture

Artificial detail can be added to a landscape by using the Textur buttons. They are located on the Lower Control Panel under the word: Textur. They consist of four buttons, of which only one can be activated at a time. The buttons are, O, L, M, H. They stand for Off, Low, Medium, and High.

The higher the texture setting, the more Vistapro will break up displayed polygons into smaller pieces. Each piece is drawn as a slightly different shade, thereby giving the landscape a more textured look.

Set your camera and target location and try rendering the images using each of the texture settings.

Setting the Timber Line

Locate the Tree button. Right below the Tree button is a numerical gadget. The number in this gadget indicates the timber line, which is the altitude above which there are no trees. Just as in nature, the timber line is a fuzzy value. Some trees will appear above the timber line, and some bare areas will appear below it.

An altitude can be entered into the numerical gadget, or you can use the Tree button to select the tree level by clicking on the Tree button and then clicking on the topographic map at a location which has the desired altitude.

If one of the tree buttons (Oak, Pine, Palm, Cactus) is not selected, Vistapro will not actually draw trees; instead it uses the tree colors (see CMap) to color the ground.

Try rendering the current landscape with different values for the tree line.

Drawing Trees

Through the use of the tree buttons, you can specify whether Vistapro will draw trees on the landscape or not.

Trees may be drawn anywhere that the tree colors are used (see Timber Line above).

Trees are time consuming to draw and may take from two to twenty times as long to render as the same scene without any trees.

To draw trees and specify the type of tree to draw, click on one of the tree buttons. The TreSiz numerical gadget in the Middle Control Panel specifies the tree size in meters.

Setting Tree Density

Use the TreDns numerical gadget located on the Middle Control Panel to specify how many of the polygons drawn with tree colors will have trees drawn on them (if one of the Tree buttons is selected). Useful values range from 0 to 256. A value of 128 will result in one half of the tree colored polygons having trees.

Setting Snow Level

The snow level is the lowest elevation where Vistapro will cover the landscape with snow. Just like the timber line, this is a fuzzy value.

The snow level can be entered directly into the numerical gadget under the Snow button, or you can click on the Snow button and then click on the topographical map.

Adding a Lake

To add a lake to your landscape, first select a location for your lake. It needs to be an area of landscape surrounded by landscape of a higher elevation. Move your mouse around until you find the lowest point in the surrounding landscape. Now click on the Lake button and then click on the topographical map at an altitude just a bit lower than the lowest elevation of the surrounding landscape. If you selected an altitude that was higher, the lake would spill over into other areas where you might not want it.

Adding a River

The River button is used to create rivers that flow downhill, from the selected starting point, following the curves of the landscape. A river will continue to flow downhill until it reaches the ocean, the edge of the topographic map, or until it runs into another river. Placing a river on top of an existing river will widen the existing one.

To select the river location, click on the River button and then on the topographical map.

Changing the Haze Level

The haze level is the amount of haze that will appear between the camera, target, and horizon. With a 0 haze level, the horizon will be crystal clear, but you will lose a little of the depth of the image. To set or change the haze level, click on the Haze button. Vistapro will generate a value based upon the distance between the camera and the target. Alternately, you can enter a value in the numerical gadget below the Haze button.

Setting the Light Direction

To change the light direction, click on the Light button on the Middle Control Panel. You will see a target drawn around the topographical map. Each circular line represents the altitude of the light source in degrees. Notice that there is a line radiating out from the center (or bulls eye). This line represents the direction of the light source.

You will also see a new Lower Control Panel. On the left of the panel are the N, E, S, and W buttons for the most simple light directions. These represent light coming from the north, east, south or west at 45 degrees above the horizon.

If you want your light source to come from one of these directions, then click on the button representing the direction that you want the light to come from. If however, you want the light to come from a different direction, click on the Custom button.

After clicking on the Custom button, move the mouse pointer to the topographical map. Notice that moving the position of the mouse pointer on the map changes the end point of the light source direction/altitude line. Once you have the direction and altitude set to your liking, click the left mouse button to accept the setting.

Alternately you can use the numerical gadgets on the Light Lower Control Panel to input values.

Shadows and Exaggeration

You will also see two buttons on the Light Lower Control Panel. They are Shadow and Exager.

If the Shadow button is selected, Vistapro will take into account the light source direction and create shadows on the landscape.

The Exager button exaggerates the shading of the landscape. With this button depressed, the rate at which shadowed areas darken is increased.

Changing Colors

Vistapro allows you to change its color map. This allows you to fine tune your image to get that perfect look of realism. It also allows you to tamper with nature; imagine flaming red snow, or pink lakes and rivers. By altering the color map, you can drastically change the look of your landscape.

Before you change colors, make sure that the LockP button is not selected. If the button is depressed, click on it to raise it.

To change the colors, click on the CMap button in the Middle Control Panel. This will activate the Color Control Panel. You will see two rows of buttons labeled with the names of landscape features. To the left are red, green, and blue slider bars. To change the color of a landscape feature, click on the button and use the slider bars to change the color.

To exit the Color Control Panel and keep the new colors, click on the OK button. If you don't want to keep any changes made, click on the Quit button.

At this point take a minute to look over chapter 6 of this manual. After you have read chapter 6, experiment with different colors until you find a set that you would like to save.

Saving the Color Map

The Vistapro color map can be saved by using the Save CMap option from the Save menu (top of the screen). Once you pick this option, you will be presented with the Vistapro File Requestor. The Filename Window will contain a list of directories. Click on the CMap directory. You should see a list of CMap files (they have a DEM extension).

Click on the Filename: text gadget and enter the filename:

TESTCMAP.DEM

followed by pressing the Enter key. This is the name that the current color map will be saved under. Now click on the Save CMAP button.

Your color map has now been saved.

Loading a Color Map

Let's load a different color map. Pick the Load CMap option from the Load menu. You will now be at the Vistapro File Requestor. Switch to the CMap directory and click on the file TUTCMAP.DEM. Now click on the Load CMap button.

Set your camera and target positions and render an image. As you can see the landscape looks quite different.

Pick the Load CMap again and load the file that you previously saved: TESTCMAP.DEM.

Saving your Rendered Image

Now that you know how to create beautiful and bizarre images, the next step is to be able to save your masterpiece for viewing at a later date.

Using the techniques covered in earlier sections, render an image that you would like to save.

Now pick the Save IFF option from the Save menu. You will see the Vistapro File Requestor. Switch to the Pics directory and then click on the Filename: text gadget. Enter:

MYPIC.IFF

followed by pressing the Enter key. Now click on the Save IFF button.

Your picture is now saved and can be viewed by using the Load IFF option or by using any Amiga paint or viewer program.

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